

BOTANICAL ABSTRACTS

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ENTRIES 1-218

No. 1

BOTANICAL EDUCATION

C. STUART GAGER, *Editor*

1. [ANONYMOUS.] **Milwaukee Public Museum.** Museum Work 1: 101. Jan., 1919.—Botanical exhibit, opened to public in Oct., 1918, contains systematic collection of fungi, mainly mushrooms from Wisconsin, both dried and wet preparations, and 50 groups of wax casts of fleshy fungi; a considerable series of exhibits of economic botany, from crude products to manufactured articles, ultimately to be arranged by botanical families; 54 models of entire plants, each representing a distinct family; numerous enlarged models of parts; 37 garden vegetables. Also a series of ten "war garden" vegetables, illustrating their more common fungus and insect pests, with labels giving directions for treatment; a perennial cut flower exhibit of wild and cultivated plants.—*C. Stuart Gager.*

2. MINER, RALPH WALDO. **Educational training of museum instructors.** Museum Work 1: 114-117. Jan., 1919.—A pedagogical training is of great assistance to a museum instructor who has had a course of training in actual practice of the museum, and who also possesses natural qualities of enthusiasm, tact, and personality. Discussions by Alice W. Kendall, Louise Connolly and Gertrude Underhill, all emphasizing necessity of pedagogical training for museum docents.—*C. Stuart Gager.*

3. REA, PAUL M., and AGNES L. VAUGHAN. **The development of museum instruction. What American museums are doing.** Museum Work 1: 109-113. Jan., 1919.—Paper read at museum instructors session of American Assoc. of Museums, May, 1918. Gives outline of educational activities, (in addition to public exhibits) of Amer. Museum Nat. Hist. (New York City), Arnot Art Gallery (Elmira, N. Y.), Boston (Mass.) Museum of Fine Arts, Children's Museum (Boston), Cleveland (Ohio) Museum of Art, John Herron Art Institute (Indianapolis, Indiana), Metropolitan Museum of Art (New York City), Newark (N. J.) Museum, Park Museum (Providence, R. I.), San Diego (Calif.) Museum, Syracuse (N. Y.) Museum of Fine Arts, and New Jersey State Museum (Trenton).—*C. Stuart Gager.*

4. ROWE, L. EARLE. **Practical training of museum instructors.** Museum Work 1: 122-126. Jan., 1919. Discussions by Deborah Kallen and Edith R. Abbott.—*C. Stuart Gager.*

5. VAUGHAN, AGNES L. **Special training of museum instructors.** Museum Work 1: 118-122. Jan., 1919.—Historic training in posture, voice, gesture desirable. Discussions by Ann E. Thomas and Eva W. Magoon.—*C. Stuart Gager.*

ECOLOGY AND PLANT GEOGRAPHY

H. C. COWLES, *Editor*

6. BAKER, FREDERICK S. *Aspen as a temporary forest type.* Jour. Forestry 16: 294-303, 3 fig. Mar., 1918.—The author's studies were undertaken largely to test the recently expressed view of FETHEROLF that the aspen (*Populus tremuloides*) is a permanent rather than a temporary forest type in the Great Basin. It is admitted that many stands are not ephemeral but it is concluded that "there is no evidence that the aspen by itself or by means of associated fungi and biotic factors is able to withstand invasion by white fir or Douglas fir." Its prominence must be accounted for by repeated fires, which have eliminated conifers and favored aspens, because the latter exhibit sprout reproduction. Thus the aspen is a temporary or successional type in the Great Basin as elsewhere. (See also Bot. Absta. 1, Entry 252.)
H. C. Cowles.

7. BEWIS, J. W. *The grasses and grasslands of South Africa.* 15 × 22 cm., vi. + 161 p. 24 fig., 1 map. Davis & Sons: Pietermaritzburg, 1918. (\$2.00.)—The first part of the volume is devoted to a series of keys for the identification of the 500 species of grasses which form a conspicuous portion of the flora. In the remainder of the book are discussed: (1) the sources of the structural and ecological characteristics of the principal species; (2) the general character of the grasslands and the development of the various association types and, (3) the economic application of the ecological principles involved. There are types comparable to the "short grass," "wire grass" and prairie grass of North America, as well as a tall, coarse *Andropogon* association (this last developing upon potential woodland areas) and a mountain tussock grassland. The discussion of the successional relations of these and other association types into which grasses enter, gives a comprehensive general sketch of the plant communities of the major portion of South Africa.—In the final chapter the feeding value of the different types of grassland as well as the comparative merits of native and introduced species is discussed. The effect upon the productivity of various types of grassland by various kinds of grazing and the results from grass burning are considered, and some of the ecological problems involved are pointed out. An appendix contains a list of English, Dutch, Zulu and Sesuto names of the more important species.—Geo. D. Fuller.

8. BOUYGUCOS, GEORGE J., AND M. M. MCCOOL. *Determining the absolute salt content of soils by means of the freezing-point method.*—Jour. Agric. Res. 15: 331-336. Nov., 1918.—When the soil is approximately saturated with water the freezing point was found to afford an indirect means of measuring the salt contents of the soil.—H. L. Shantz.

9. DRUDE, O. *Licht- und Wärmestrahlung als ökologische Standortsfaktoren.* [Light and heat irradiation as ecological factors.] Flora 111, 112: 227-267. 2 fig. 1918.—The major portion of the article is occupied with a critical discussion of the theories concerning the relation of heat-rays and light-rays to the structure of the leaf and to the ecology of the plant. Author believes that those structures, especially in the leaf, which are characteristic of plants of xerophytic formations are to be regarded as a protection against too great heat absorption and the accompanying high transpiration, while the assimilation in leaves thus protected is favored by the solar irradiation and would not reach the optimum in diffuse light. He supports his views by a limited number of heat measurements made with ordinary thermometer, black-bulb thermometer, and black-bulb thermometer *in vacuo* at altitudes of 1100-1200 m., where the temperatures in fully insulated tufts of low plants may exceed the temperature *in vacuo* and be as much as 37° above the temperature of the air. Even slight differences of exposure, such as the shade of a rock, may offset completely the effect of insolation and account for the radically different vegetation in such locations. At timber-line the trees may live in temperatures as high as 25° or 30° and the grasses as high as 40° even in September, which may account for the high altitudes reached by certain low-growing ruderal species.

Author did not attempt to measure the actual internal temperature of such plants. He develops a formula for determining the effective maximum temperatures for insolated plants by subtracting the black-bulb temperature from the temperature in *sacso*, multiplying it by the percentage of sunshine and adding the result to the black-bulb temperature. Averaging this with the nocturnal minimum gives the daily mean, which is found to be (for five days in June) 6° higher than the usual figure.—H. A. Gleason.

10. ELMORE, C. J. Changing diatoms of Devil's Lake (North Dakota). Bot. Gaz. 65: 186-190. Feb., 1918.—The author discusses the phenomenon of the changing diatoms of Devil's Lake, North Dakota, and the smaller lakes in its vicinity. These small lakes were formerly part of the main lake but have been separated from it by the lowering of the water. Devil's Lake, which was formerly a fresh-water lake fed by streams is passing through a rapid transition. The water is becoming salt, however the salinity differs from that of the sea. It also differs somewhat in different parts of the lake and at different seasons of the year. Of the 56 species of diatoms identified by the author, 25 are genuine fresh-water species; 20 are found in fresh or brackish water; 2 in fresh, brackish, or salt-water; 2 in brackish or salt-water; and 4 marine. The presence of the marine species may be due to importation by migratory birds. The 25 fresh-water species present the greatest anomaly for there is nothing in their appearance to indicate that they have been modified by the change in environment. This fact would seem to confirm what has been observed elsewhere that many diatoms adapt themselves readily to changes in environment.—Elizabeth Dorothy Wulst Broun.

11. EMOTO, Y. On the relative efficiencies of cross and self fertilization in some plants. [Title in English, text in Japanese.] Bot. Mag. Tokyo 32: 153-186. 2 fig. June, 1918.—Results of fertilization in flowering plants are markedly different according to mode of pollination. Materials used were selected from the most common cultivated plants of Japan, belonging to Cruciferae, Iridaceae, Liliaceae and Primulaceae. Usually results (size of fruit, weight of seed etc.) are best when different individuals share in cross fertilization although in *Tritonia aurea*, fertilization by pollen of the same individual results in greater percentage of fertilized flowers than when fertilization is by pollen of another individual. Self fertilization sometimes brings good results for length of fruit in *Primula obconica* and for weight of seed in *Brassica campestris*, *Hyacinthus orientalis*, *Freesia Leichthini* and *Tritonia aurea*. In *Primula sinensis*, fruits produced by flowers having long stamens when pollinated by flowers with short stamens are better in size and weight of seed than either those produced by flowers of the latter when pollinated by the former, or those produced by crossing the same kind of flowers.—K. Morita.

12. JEFFREYS, HAROLD. On the rarity of certain heath plants in Breckland. Jour. Ecol. 6: 226-229. Nov., 1918.—The author records the result of an experiment in the transfer of *Nardus stricta*, *Deschampsia flexuosa* and *Molina coerulescens*, plants common to most of the heaths of England, to the more exposed and more xerophytic conditions of the Breckland heath of Suffolk. Plants transferred to the drier areas proved incapable of surviving but *Nardus* and *Molina* appeared to be quite able to hold their own upon damper parts of the same heath when they were protected from the attacks of rabbits.—Geo. D. Fuller.

13. MOORE, GEORGE T. Algological notes: III. A wood-penetrating alga, *Gomontia lignicola*, n. sp. Ann. Missouri Bot. Gard. 5: 211-224. Pl. 13-15. 1918.—See Bot. Absts. 1, Entry 766.

14. SETCHELL, W. A. Parasitism among the red algae. Proc. Amer. Phil. Soc. 57: 155-172. 1918.—See Bot. Absts. 1, Entries 767, 1376.

FOREST BOTANY AND FORESTRY

RAPHAEL ZON, *Editor*

15. BIRCH, D. C. Extra costs of logging National Forest stumpage. Jour. Forestry 16: 909-914. December, 1918.—The extra expense in logging government stumpage is due to "(1) increased construction cost; (2) extra care in felling, bucking, yarding; (3) felling snags and diseased trees; (4) disposal of snags and brush; (5) fire-protective requirements." Time studies gave the costs of these operations as \$0.855 per thousand which is greater than the cost of private logging. Offsetting this is a cost of \$0.78 due to better quality timber and saving in felling and bucking, and in fire protective measures or a net increase in cost of \$0.075 per thousand.—E. N. Munns.

16. BREWSTER, D. R. Relation between height growth of larch seedlings and weather conditions. Jour. Forestry 16: 861-870. —Data on 112 larch trees in Idaho covering 22 years show the height growth in 1914 to be above the average. Comparisons of growth with the weather records show this growing season to have had more than the average number of clear days, a mean temperature slightly higher than the average and gentle showers well distributed through the growing season. This may be the reason for the greater growth.—E. N. Munns.

17. HUTCHINSON, A. H. Limiting factors in relation to specific ranges of tolerance of forest trees. Bot. Gaz. 66: 465-493. 7 fig. Dec., 1918.—The range of forest trees in Canada is correlated with available information on soil and climate. No quantitative data are given. Temperature, moisture and soil are regarded as the factors most commonly limiting the distribution of trees; but it is shown in a number of specific cases that other factors, such as light, competition, and the time element may be of great importance. Thus, the southern range of *Abies balsamea* is sometimes determined by competition with *Acer* and *Taxus*; *Larix americana* is often forced by competing species into habitats which they are unable to occupy. This is generally true of species having a wide range. That the northern range of trees is not always determined by temperature is shown by the fact that the lines marking the northern range of a number of species are intersected by isotherms. Some 13 species are discussed in more or less detail.—G. A. Pearson.

18. SAMFSON, ARTHUR W., and WEYL, LEON H. Range preservation and its relation to erosion control on western grazing lands. U. S. Dept. Agric. Bull. 675. 35 p. 1918.—A study of the relationship between range preservation and erosion was made on the Manti Forest in Utah by comparing the run-off and the erosion from two areas. The two most important factors were found to be the melting of snow and the summer rains. The run-off from melting snow causes severe erosion when the cover is sparse and the slopes steep, and run-off and erosion varies in intensity with the climatic factors, temperature being most important. Most rapid snow melting and most severe erosion occur where there is a lack of vegetation. With rainfall, the extent of erosion and run-off depends on the rate at which rain falls, the steepness of slope, the presence of established gullies, the character of the soil, and the density and character of the vegetation.—Studies of plant growth brought out that erosion is detrimental to plant growth because of lack of adequate soil moisture and lack of plant nutrients due to the reduction of soluble plant foods. On eroded soil, a new series of succession takes place and to reestablish the more desirable and permanent species as occupied the soil before depletion requires years of time and good range management.—The amount of organic matter affects greatly the water-holding capacity and is shown in the little erosion from fully vegetated lands except during intense rainfall or prolonged heavy rain, and then erosion is not serious. Denuded or sparsely vegetated slopes may after small storms have both run-off and erosion.—General observations show moderate sheep grazing on sparsely vegetated range increases the run-off and erosion when the physical factors are favorable to erosion and where erosion is already in the incipient stage. The seriousness of erosion is largely determined by the extent to which ground cover is maintained and this cover may be

destroyed and serious damage result from overgrazing or mismanagement of stock. Deferred and rotation grazing should be practiced and the stock kept under control at all times with slight changes as erosion becomes manifest. With erosion once under way, mechanical methods are necessary to assist nature.—E. N. Munnis.

19. SAMPSON, ARTHUR W. Effect of grazing upon aspen reproduction. U. S. Dept. Agric. Bull. 741. Feb., 1919.—The injury and mortality chargeable to the presence of live stock is roughly proportional to the closeness to which the lands are grazed. Observations covering a five-year period in standing timber on sheep range showed that 27.2 per cent of the reproduction was either injured or killed on lightly grazed plots, 31.8 per cent on moderately grazed areas, and 65 per cent on heavily grazed plots. A large proportion of the nonbrowsed sprouts are killed by causes other than grazing. In standing timber on cattle ranges also the injury varied according to grazing intensity, but was less than on the sheep range. During 1915 and 1916 the average percentage of injured and killed sprouts by cattle browsing was 1.6, 14, and 26.8 on lightly, moderately, and heavily grazed plots, respectively. On clear-cut lands, where the reproduction is conspicuous and the stand even, the annual mortality due to sheep grazing is exceedingly heavy. As a rule three years of successive sheep grazing on such lands results in the destruction of the entire stand. Some injury is also caused by cattle on clear-cut areas, but unless the range is stocked with cattle beyond its normal carrying capacity there is little danger of the reproduction being destroyed beyond the requirements necessary for the establishment of a full commercial stand.—A comparison of the character and intensity of browsing shows that a notably greater proportion of the woody stems is consumed by sheep than by cattle. Even in the autumn after the leaves have dropped sheep favour a considerable quantity of the stems of a single season's growth regardless of the presence of an abundance of choice forage. In the case of cattle, however, the naked stems are practically untouched.—On lands protected from grazing aspen sprouts are produced only during the first two seasons after cutting. On grazed lands a considerable number of sprouts are sent up for three successive seasons following the removal of the timber. The third year's reproduction, however, appears from two to five weeks later than that produced in the two previous seasons and is, for the most part, eliminated shortly after its appearance by adverse climatic factors, chiefly frost.—A surprisingly large proportion of the reproduction produced even on the most favorable sites is killed during the first three years of its growth by causes other than grazing. Frost and bark-eating mammals, notably gophers, field mice, and rabbits, are mainly responsible for such mortality. Much of the damage caused by gophers and mice is done under the snow during winter or early spring.—The annual rate of height increment of the aspen reproduction averages about 15 inches. Hence sprouts 3 years of age are exempt from serious injury by sheep, and those from 4 to 5 years of age are free from serious injury by cattle.—Aspen is practically unable to reproduce under its own shade and the best means of obtaining vigorous and dense reproduction, and at the same time of harvesting the timber economically, is to clear-cut the lands or to thin the stand heavily. [See Bot. Absts. 2, Entry 227.]—G. A. Pearson.

GENETICS

GEORGE H. SHULL, *Editor*

20. BAUR, E. [Rev. of: SIEMENS, H. W. *Die biologischen Grundlagen der Rassenhygiene und der Bevölkerungspolitik*. [The biological foundations of race-hygiene and of eugenical policy.] 8vo, 80 p., 8 fig. J. F. Lehmann: München, 1917.] *Zeitschr. induct. Abstamm. Vererb.* 19: 312. Aug., 1918.—See Bot. Absts. 2, Entry 387.

21. BAUR, E. [Rev. of: SIEMENS, H. W. *Biologische Terminologie und rassen-hygienische Propaganda*. [Biological terminology and eugenical propaganda.] Arch. Kass. u. Ges. Biol. 1917: 257. 1917.] *Zeitschr. induct. Abstamm. Vererb.* 19: 311-312. Aug., 1918.—See Bot. Absts. 2, Entry 388.

22. BERGSTROM, SVERKER. Sur les moments de la fonction de corrélation normale de n variables. [On the moments of the function of normal correlation of n variables.] *Biometrika* 12: 177-188. Nov., 1918.—Demonstrates a simple general formula for calculating the product-moment of any number of variables, distributions of which are in accordance with normal probability curve. The equation follows:

$$M(x_1 x_2 x_3 \dots x_k) = S r_{1,2} r_{1,3} \dots r_{1k} r_{2k}.$$

Left-hand expression means the product moment of variables x_1, x_2 , etc., each measured in terms of its standard deviation. Right-hand expression means sum of products of the correlations in all groups which can be made so as to involve each variable once and only once. As many of the variables, however, may be identical, as may be desired. The following are examples:

$$M(xyzw) = r_{xy}r_{zw} + r_{xz}r_{yw} + r_{xw}r_{yz};$$

$$M(xy^2z) = r_{xy}^2 + 2r_{xz}r_{yz}.$$

Product-moment of an odd number of variables is zero.—Sewall Wright.

23. DETLEFSEN, J. A., AND E. ROBERTS. On a back cross in mice involving three allelomorph pairs of characters. *Genetics* 3: 573-598. Nov., 1918.

24. ELST, E. M., AND J. B. PARK. Studies on self-sterility. II. Pollen-tube growth. *Genetics* 3: 353-366. 3 fig. July, 1918.—Author has found that cross and self sterility in certain *Nicotianas* is due to slow growth of pollen tubes. Pollen tubes of *Nicotiana glauca*, *N. angustifolia*, *N. glutinosa*, and *N. Forgetiana* grew well on artificial media, but best on 2 per cent agar plus 20 per cent cane sugar. Maximum length attained was 0.6 mm., usual length being .1-.2 mm. Growth starts slowly, reaching maximum rate in 12-24 hours, and then declines. This is quite unlike growth of tubes in styles, where growth is continuous and rate either remains constant or is regularly accelerated. Numerous attempts failed to indicate that chemical substances in stigmas, styles and ovaries have directive influence on pollen tubes or that there is greater effect of such substances in styles where fertilization is possible, than in styles of "incompatible" plants, but there was unmistakable evidence that presence of gynaeceum parts promotes pollen-tube growth. Failure to show directive influence may have been due to too rapid diffusion of chemical stimulants. Attempts to produce self-fertilization in self-sterile plants by pollination of mutilated styles seem to have succeeded in two cases. Pollen germinates as well on "incompatible" stigmas as on "compatible," and 5-10 times as many tubes are produced as are required to fertilize all the ovules. Microscopical study of styles at definite intervals after pollination showed that, in case of self-pollination and in "incompatible" crosses, pollen-tube growth proceeds at constant rate (average 18 mm. in eight days), while in "compatible" crosses growth starts at approximately the same rate, but rate is accelerated in manner suggestive of autocatalytic reaction. In cases diagrammed fertilization took place in four to five days, total length of styles traversed being 34 to 36 mm. Toward end of flowering season rate of growth of self pollen tubes, or in incompatible crosses, becomes more rapid, but there is little evidence of acceleration during their passage down the style.—Author thinks evidence indicates that there is no inhibition of development of pollen tubes in self-fertilization or in incompatible crosses; but that, in compatible crosses, stimulative substances are secreted by pistil owing to presence of catalyzer produced by pollen-tube nucleus, this catalyzer being produced because in certain specific hereditary factors, plant which produced the pollen differed from plant on which the pollen was placed.—Greater growth of self tubes at end of season is attributed to unrelated phenomenon, namely, parasitism of pollen tube on the now less resistant cells of the pistil.—Geo. H. Shull.

25. EMBODY, G. C. Artificial hybrids between pike and pickerel. *Jour. Heredity* 9: 253-256. Fig. 4-6. Oct., 1918.—Occasional finding of wild type fishes in Lake Cayuga, that are intermediate in some respects between northern pike (*Esox lucius*) and pickerel (*Esox reticulatus*) suggested that they might be natural hybrids. Author studied spawning behavior of the two species and found that their spawning seasons overlap and that there was

possibility of chance crossing. He also artificially crossed the two species and was able to rear a few specimens, three of which, at six months after hatching, measured, respectively, 15.2, 13.8 and 9.1 cm. Photographs and descriptions of these specimens indicate that they are intermediate with respect to scalation of cheeks; while in color pattern that of pike is dominant, at least in juvenile stages. It would be interesting to go beyond the F_1 generation, but this has not as yet been accomplished.—H. H. Newman.

26. FEDERLEY, HARRY. Zeitschr. indukt. Abstamm. Vererb. 19: 210. June, 1918. [Review of: TANAKA, YOSHIMARO. Genetic studies on the silkworm. Jour. College Agric. Sapporo 7: 129-255. Pl. 1-4. 1916.]—Reviewer notes that Tanaka in this article summarizes his previous work on silk worms, listing 12 factors, 9 of which influence coloration, markings, and skin-structure, of the caterpillar, 1 the number of moults, and 2 color of cocoons. Only in one case is linkage complete in both sexes, in others it is complete (no crossing over) in female, partial in male. Greater number of independent characters than in *Drosophila*, is related to fact that *Bombyx* has 28 chromosomes. Reviewer expresses view that reversal of linkage relations with regard to sexes, as compared with *Drosophila*, is due to fact that in *Bombyx* the female is heterozygous while in *Drosophila* male is heterozygous.—Geo. H. Shull.

27. HARPER, R. A. Organization, reproduction and inheritance in *Pediastrum*. Proc. Amer. Phil. Soc. 57: 375-439. Pl. 5-6, 55 fig. 1918.—*Pediastrum* is regarded as exceptionally valuable material for study of various problems, involving origin, heredity, modification and interrelation of characters, because of its simple organization and its inter-specific variability as regards structural characteristics. This study, being one of a series, deals mainly with two species, *P. Boryanum* Kg. and *P. asperum*. Life histories of each are described and compared in great detail with special reference to origin, development and heredity of such characters as spacial interrelation of cells in colony, green color, and shape of cell. Results from statistical studies of certain types of characters are given and discussed. Number of cells in colony tends to be inherited, though fluctuating variability is very marked. Four-lobed cell character is strictly inherited though suggestion is made that the environmental complex may have led in successive generations to development of this four-lobed form and its subsequent hereditary fixation—in other words, the inheritance of an acquired character. Shape and position of the two types of lobe are also strictly inherited, though modified by changes in environmental complex. Cell form determines colony form. Three degrees of directness in hereditary transmission of *Pediastrum* characters—(1) direct transmission by division of cell character, as green color by chloroplasts; (2) somewhat indirect transmission of adult cell characters, not visible as such in germ cell (lobed cell form); (3) entirely indirect transmission of colony characters (arrangement of cells). Characters of cells are of two distinct categories, metidentical (green plastid color), and characters dependent on organism as a whole (cell form). Neither type necessitates assumption of hereditary factors in a specialized germ plasma to account for their transmission. Form of colony is typical in proportion to vigor of swarm spores at time of colony organization. [See Bot. Absta. 2, Entry 60.]—O. E. White.

28. HARRIS, J. ARTHUR. Further illustrations of the applicability of a coefficient measuring the correlation between a variable and the deviation of a dependent variable from its probable value. Genetics 3: 328-352. 6 diagrams. July, 1918.—Usefulness of method proposed by author some years ago is here illustrated by application to ten cases taken from literature, as follows: (1) Proportionality of parts in *Paramecium* (Jennings). Confirms conclusions of Jennings and adds that when *Paramecium* varies in length, both anterior and posterior fractions of body contribute to this variation, but as total length increases, anterior portion becomes relatively shorter. (2) Absence of relationship between size of litter and sex in swine (Parker and Bullard). Confirms conclusions drawn from percentage tables by authors cited. (3) Proportion of pistillate and hermaphrodite flowers in the inflorescence of the composite *Homogyne* (Ludwig). In larger heads purely pistillate flowers are relatively less numerous and hermaphrodite flowers relatively more numerous. (4) Fertility of capsules

and viability of seed in carnation crosses (Stuart). Results are inconclusive because of small amount of data, but there is some indication that there is relatively higher failure to germinate among seeds produced many in a capsule. (4) Relationship between total number of pedicels and number of abnormal pedicels in *Spiraea Vanhouttei* (Harris). Larger inflorescences have relatively smaller proportion of abnormal pedicels; relative number of abnormal pedicels decreases as total number of abnormal pedicels increases; results are consistent; but degree of correlation is slight. (6) Interrelation of cotyledons and primordial leaves in a race of *Phaseolus vulgaris* highly variable in seedling characters (Harris). When total number of leaf homologs increases, the increase is due to far greater extent to increase in number of primordial leaves than to increase in number of cotyledons. (7) Changes in proportion of parts in developing trout (Jenkinson). Correlation between head length and total length is approximately same at all stages ($r = 0.72$ to 0.94), but correlation between total length and deviation of head length from its probable value, changes from $r = +0.65$ in first stage through $r = 0.00$ in third stage, to $r = -0.53$ in fifth stage. (8) Relation between total solids and sucrose content in juice of sugar beets. Juice with higher total solids contains both absolutely more and relatively more sugar than does juice with low total solids. (9) Relation between total number of spikelets and number of sterile spikelets in wheat (Grantham and Groff). Sterility is not merely absolutely but relatively more frequent in varieties with larger numbers of spikelets. (10) Viability of dominants and recessives in F_2 generation of Mendelian hybrids (Yule). No evidence of differential viability is found in Darbshire's mouse data.—Supplementary formulae are given for computation of correlation between a variable and the deviation of a dependent variable from its probable value.—Geo. H. Shull.

29. HERTWIG, GÜNTHER. Kreuzungsversuche an Amphibien. [Hybridization studies on amphibians.] Arch. mikrosk. Anat. 91: 203-271. 2 fig. Aug. 20, 1918.

30. HILL, ARTHUR W. The history of *Primula malacoides* Franchet, under cultivation. Jour. Genetics 7: 193-198. 1 fig., 2 pl. May, 1918.—Discovered in Yunnan, China 1884 by Père Delavay; described by Franchet, 1886; introduced into cultivation through G. Forrest, 1905, 1906; figured in Gardener's Magazine, December 5, 1908; Revue Horticole, 1912, page 156 (colored). Original plants described in detail with an account of the variations produced under cultivation. These include—increase in size of flowers, several white-flowered sports, one mauve-flowered sport, numerous double-flowered sports showing various gradations in doubling, fimbriation of the corolla and calyx segments and scented and scentless foliage. All hybridization attempts have been failures. Much variation occurs in leaf form.—O. E. White.

31. HODGSON, ROBERT W. An interesting bud-sport in the Washington navel orange. Jour. Heredity 9: 301-303. Fig. 2. Nov., 1918.—This sport shows marked increase in vigor over rest of tree which carries it, as evidenced by sudden increase in diameter of branch at point where sport originates, large vigorous leaves, and abnormal amount of fine twiggy growth. It has also acted as sucker and starved the growth on parent limb behind it. Convincing photograph accompanies the article.—Merle C. Coulter.

32. HOLDEN, H. S., AND DOROTHY BEXON. Observations on the anatomy of teratological seedlings. 1. On the anatomy of some polycotylous seedlings of *Cheiranthus Cheiri*. Ann. Bot. 32: 513-530. 17 fig. Oct., 1918.—Study of vascular anatomy of wall flower seedlings which show stages of polycotylous ranging from hemitricotylous to tetracotylous. Concludes that there are two and perhaps three modes of increase involved: (1) cotyledonary fission, a qualitative division of parent cotyledons; (2) dichotomy of growing point of cotyledon, a true quantitative increase; (3) downward displacement of foliage leaves. Conclusions and results of previous investigators discussed to show that polycotylous in other species exhibits same types of increase. [See Bot. Abstr. 1, Entry 1330.]-A. B. Stout.

33. JACKSON, S. "Rogues" among potatoes. *Gard. Chron.* 64: 210. Nov. 23, 1918.—Takes exception to Sutton's statement that only variations appearing in potatoes are color changes and mentions cases to support his contention.—*Richard Wellington.*

34. JONES, D. F. The effects of inbreeding and cross-breeding upon development. *Connecticut Agric. Exp. Sta. Bull.* 307. 100 p. 12 pl. 1918.—Review of investigations bearing on this problem together with further data collected for plants. Twelve plates illustrating results with maize are included.—Curves show per cent of heterozygous individuals for 1, 5, 10, and 15 allelomorphs in each selfed generation after a cross. Almost complete homozygosity reached by tenth generation, although theoretically, when a single selfed individual is used for each generation, homozygous condition may never be reached. Results for yield, height of plant, and statistical constants are given for eleven generations of selfed maize strains. Conclusions reached that selfing produces (1) lines which cannot be propagated, (2) lines propagated with difficulty, (3) perfectly normal lines but differing in the amount of growth attained. Comparison made from seed of successive generations of lines selfed for 6 to 9 generations showed only small differences. Six crosses between such selfed lines averaged only slightly greater for height of plant, yield, and ear length than selfed lines. Many of these strains are, therefore, nearly homozygous although some appear more so than others.—Crosses, between selfed lines, compared with parents for the number of characters such as yield and height show heterosis (stimulus accompanying heterozygosis) for many plant characters. Heterosis is also shown to have effect on endosperm development, rapidity of growth, hardiness, viability of seed, susceptibility to smut, *Ustilago zeae*, and "damping off" in radishes.—Effects of inbreeding and crossbreeding have been placed on a Mendelian basis, heterosis being explained by dominance of linked growth factors. Linkage prevents homozygous type from containing as many growth factors as can be obtained in cross. Author says this hypothesis seems logical outgrowth of former view, due to increasing knowledge of methods of inheritance.—*H. K. Hayes.*

35. KEMPTON, J. H. The ancestry of maize. *Jour. Washington Acad. Sci.* 9: 3-11. Jan. 4, 1919.—Critical review of recent article on "Evolution in maize" by WEATHERWAX [*Bot. Absts.* 2, Entry 76] who attempts to defend theory that genus *Zea* along with *Euchlaena* and *Tropaeum* have descended from common ancestral form now extinct. Present author maintains this theory is not established by arguments presented, which are based mainly upon organological comparisons.—*L. H. Smith.*

36. LENZ, FRITZ. Alternative Modifikationen bei Schmetterlingen. [Alternative modifications in butterflies.] *Zeitschr. indukt. Abstamm. Vererb.* 19: 304-309. Aug., 1918.

37. MIDDLETON, AUSTIN RALPH. Heritable effects of temperature differences on the fusion rate of *Stylomychia pustulata*. *Genetics* 3: 534-572. 8 fig. Nov., 1918.

38. MILN, T. E. Fasciation not inherent. *Gard. Chron.* 64: 210. Fig. 83. Nov. 23, 1918.—Speculation regarding inheritance of peculiar fasciation in vegetable marrow, appearing in previous issue of *Gard. Chron.*, provokes present brief comment on hereditary behavior of fasciations in wheat. Among several cases he has observed author has never found "double" heads in wheat to be inherited.—*L. H. Smith.*

39. NAFZIGER, T. E. How sorghum crosses are made. *Jour. Heredity* 9: 321-322. Nov., 1918.—Detailed instructions with respect to technique of making sorghum crosses are given. Attention is called to the difficulty of crossing the milos.—*C. E. Myers.*

40. PHILIPS, A. G. Satisfactory method of pedigreeing fowls. *Rel. Poultry Jour.* 24: 1107-1108, 1174-1176. 5 fig. 1918.—Compilation of various methods of pedigreeing poultry which have been found satisfactory at Purdue University. [See also *Exp. Sta. Rec.* 38: 577. June 14, 1918.]—*H. D. Goodale.*

41. RAUNKIAER, C. Über den Begriff der Elementarart im Lichte der modernen Erblichkeitsforschung. [On the concept of elementary species in the light of modern genetical investigations. Zeitschr. induct. Abstamm. Vererb. 19: 225-240. 3 fig. 1918.—Linnaeus's formal definition of species and his practical delimitation of species were not in agreement; his formal definition made species a group hereditarily distinct, constant in successive generations, and resembling parents; his practical delimitations of species which have determined the ordinary notions of species, were wider than his definition warranted; he lightly disregarded variations.—Self-fertilizing homozygous organisms agree with Linnaeus's formal definition, and in previous publication Raunkiaer proposed term "geno-species" for such homozygous biotypes. Geno-species have become group units in genetics. Smallest unit in taxonomy is "elementary species." While geneticist determines geno-species by progeny of individuals in question, taxonomist determines elementary species by direct examination of individuals themselves. Author points out that paleontological material would remain unclassified if taxonomy required genetic criteria. He defines taxonomic unit (elementary species) as totality of individuals similar at same developmental stage under same circumstances; he names this group also an "isoreagent," since it is totality of all isoreacting individuals. To illustrate he shows that in F_2 from pair of parents with single factor difference (with dominance) geneticists would make two geno-specific groups and one hybrid group, while taxonomist would see only two isoreagent groups.—J. P. Kelly.

42. RAUNKIAER, C. Om Løvspringstiden hos Afkommet af Bøge med forskellig Løvspringstid. [Danish, with English abstract]. [On leaftime in the descendants of beeches with different leaf times.] Bot. Tidsskr. 36: 197-203. 1918.—Observing beeches under conditions that would eliminate as far as possible influence of age and soil, author saw that certain trees early in leaf remained earliest through three seasons. Fruits of one very late, two late, one early, and one very early, were planted to see if time of leafing is hereditary. Author found close correspondence between mother and offspring, and concludes that within species *Fagus sylvatica* there are subspecies or "isoreagents" differing in regard to time of leafing.—J. P. Kelly.

43. RIEBESELL, P. Einige zahlenkritische Bemerkungen zu den Mendelschen Regeln. [Some remarks critical of ratios in Mendelian inheritance.] Biol. Zentralbl. 38: 329-340. Aug., 1918.

44. RUSSELL, E. S. Derniers progrès réalisés dans l'étude de la variations, de l'hérédité et de l'évolution. [Rev. of: LOCK, R. H. Recent progress in the study of variation, heredity and evolution. 4th ed., 8vo, xii + 338 p., 6 portraits, 47 diagrams. John Murray: London. 1916.] Scientia 12: 68-69. Jan. 1, 1918.—This fourth edition has been revised by Dr. L. Doncaster, and contains portrait of author and brief biography by his widow. Reviewer points out that author makes common mistake of assuming that conscious effort of organism plays principal rôle in Lamarckian evolution. Lamarck carefully avoided making such statement, the perception and effort put forth by the organism being for most part unconscious or subconscious.—Geo. H. Shull.

45. SCHIEMANN, E. [Rev. of: HAENICKE, A. Vererbungsphysiologische Untersuchungen an Arten von *Penicillium* und *Aspergillus*. [Genetical investigations on species of *Penicillium* and *Aspergillus*. Zeitschr. Bot. 8: 225-343. 1 pl., 11 fig. 1916.] Zeitschr. induct. Abstamm. Vererb. 19: 310-311. Aug., 1918.

46. SHAMEL, A. D. Lemon orchard from buds of single selected tree. Jour. Heredity 9: 319-320. Fig. 11. Nov., 1918.—40-acre orchard with 1700 trees and no off-type trees.—Merle C. Coulter.

47. SHAMEL, A. D., AND C. S. POMEROY. A fruiting orange thorn. Jour. Heredity 9: 313-318. Fig. 8-10. Nov., 1918.—Illustrates abnormally large thorns on rapidly growing branches of Washington navel orange, some of which have developed into branches bearing

fruit, leaves, and secondary thorns. Discusses undesirability of thorns in citrus growing.
—*Merle C. Coulter.*

48. SIRMENS, HERMANN W. [Rev. of: SEMON, RICHARD. Die Fusssohle des Menschen. Eine Studie über die unmittelbare und die erbliche Wirkung der Funktion. [The footsole of man. A study of the direct and the hereditary effect of function.] Arch. mikrosk. Anat. 82: 164-211. 1913. Zeitschr. induct. Abstamm. Vererb. 19: 200-210. June, 1918.—Semon cited instance of excessively club-footed girl who developed callosities on dorsal surface of foot, closely resembling those normally developed on foot-sole. As peculiarities of sole are foreshadowed in fetal stages he concluded that here is instance of inheritance of an acquired character. Reviewer admits that this is, as in so many cases, an enticing hypothesis, but points out that Semon's chief argument, namely, that condition of foot-sole in fetus has no selective value, is not convincing because selective value of a character may depend upon some other character with which it is strongly correlated.—*Geo. H. Shull.*

49. SMITH, KIRSTINE. On the standard deviations of adjusted and interpolated values of an observed polynomial function and its constants and the guidance they give towards a proper choice of the distribution of observations. Biometrika 12: 1-85. 9 diagrams. Nov., 1918.—Problem investigated in this paper is manner in which a limited number of observations should be distributed relative to one variable in order to yield greatest amount of knowledge about another variable, known to be a function of the first. A function of n th degree can best be determined by bunching the observations in $n + 1$ groups distributed in a certain way. Distribution depends on whether errors of observation are believed to be uniform for all values of the first variable, or to vary. Cases of continuous increase of errors in one direction, and increase or decrease in both directions, are investigated. There is also analysis of effects of continuous distribution of observations. Continuous distribution of observations, supplemented by taking a certain percentage of them in bunches at ends of the range, is found to have advantages.—*Severall Wright.*

50. STARK, P. Die Blütenvariationen der Einbeere. [Floral variations of *Paris quadrifolia*.] Zeitschr. induct. Abstamm. Vererb. 19: 241-303, 36 fig. Aug., 1918.

51. SUTTON, ARTHUR W. Bud variation in potatoes. Gard. Chron. 64: 190, 199-200. Fig. 79. Nov. 9, 16, 1918.—Maintains that all authenticated bud sports are color changes in skin of tubers. Variations in several varieties are noted, both losses and additions of such skin colors having occurred. Criticism is made of usual methods employed in determining bud variations. [See also following Entry, 52.]—*Richard Wellington.*

52. TAYLOR, GEO. M. Bud variation in potatoes. Gard. Chron. 64: 229. Dec. 7, 1918.—Objects to statements made by Sutton in regard to bud variations calls attention to differences between mutants and "rogues," and states that during this season he has two instances of totally different types to parent on stolon otherwise throwing tubers true to type. [See also preceding Entry, 51.]—*Richard Wellington.*

HORTICULTURE

W. H. CHANDLER, *Editor*

53. CONDIT, I. J. History of the fig in California. Fig and Olive Jour. 2 (No. 12, May). Ind. 3 (No. 1, June). 1918.—The Mission fig, Mission olive and Mission grape were introduced by the Mission Fathers more than a century ago. Later introductions, included in Dr. Gustave Eisen's bulletin, are mentioned. In 1894 Mr. John Rock, of Niles, received from the U. S. Department of Agriculture scions of 66 varieties, known as the Chiswick collection furnished to the Department by the Royal Horticultural Society of London. These scions were inserted in old trees on the nursery grounds, and were in good condition in 1914. Since then those not killed by gophers were grubbed out. Fortunately the greater part of the col-

lection had been duplicated at the U. S. Plant Introduction Garden at Chico.—One of the most interesting and varied collections has been assembled by Mr. J. Leroy Nickel at his place at Menlo Park. At one time this collection included the varieties collected by John Rock, Felix Gillet and the Department of Agriculture, besides many importations from France and other parts of Europe, and totaled 125 varieties.—In the spring of 1886, E. W. Martin planted a seedling fig orchard at Loomis, Placer County, the trees having been raised from seeds of imported Smyrna figs. This orchard developed many interesting and valuable capri figs, as well as promising varieties of the Smyrna type. In 1908 the orchard was leased by the U. S. Department of Agriculture, and since then cuttings from the best trees have been distributed free to growers, by application to G. P. Rixford of San Francisco.—The author in conclusion presents the main facts he has gathered regarding the so-called Kadota fig. Somewhere between 1889 and 1891 the firm of Twogood & Cutter, nurserymen of Riverside, received from H. E. Van Deman of the Department of Agriculture, seven varieties of figs. Among them was one called Dottato which seemed worthy of propagation. All the rest were destroyed. Mr. Cutter showed specimens of the fruit and invited people to sample it at the Fruit Growers Convention, at Los Angeles, about 1892. About 1895 it was found in the hands of Mr. Taft, of Sawtelle, who gave it the name Kadota, although the tag on the original tree read Dottato. Mr. Cutter believed, as stated in the Riverside Press and Horticulturist, that he had found a fig which would be of considerable value for table use and possibly for shipping because of its good quality and freedom from splitting, and he placed the Dottato at the head of all the varieties with which he was acquainted. Mr. James Mills, now of Hamilton City, formerly of Riverside, also pronounces it the finest fig he ever tasted.—The annual report of the Pomologist, contained in the report of the Secretary of Agriculture for 1890 reports the distribution of the Dottato and others.* The writer has already published facts regarding the history of this fig and the origin of the misnomer "Kadota." Since it is a misnomer, he believes the use of the name should be discontinued and that Dottato, the correct name, be substituted.—G. P. Rixford.

54. JENSEN, C. A. **Humus in mulched basins, relation of humus content to orange production, and effect of mulches on orange production.** Jour. Agric. Res. 12: 505-518. Feb. 25, 1918. Humus determinations were made at intervals in soil from basins around orange trees that had been mulched with manure and alfalfa. The results showed similar increases of humus from the two materials, but the yield of fruit was not correlated with the increases in humus. Alfalfa produced considerably greater yields than manure. Much larger yields of fruit were produced by the use of manure as a mulch than when applied broadcast and plowed down. The yields of fruit as affected by a number of other organic materials were also noted. Jensen concludes that the effects produced are not due to the humus formed, but to plant food made soluble by the action of the organic materials on the soil constituents.—W. G. Kelly.

55. MACKIE, D. B. **Notes on a navel variety of the Satsuma orange.** California Citrograph 4: 20. Nov., 1918.—Satsuma oranges with a navel mark were observed in Japan by the writer in 1908 and later in 1915. Recently a paper on the subject, entitled, "The appearance of the navel mark on the Satsuma orange," has been published by A. Kikuchi, Director of the Yamagawa Experiment Station. A summary of the paper is given.—I. J. Condit.

56. STEWART, JOHN P. **The fertilization of apple orchards.** Pennsylvania State Coll. Bull 153: 1-31. 1 fig. May, 1918.—The present discussion is based on six experiments in bearing orchards, and covers a production of 36,192 bushels of fruit during the last ten years. Two of these orchards received no cultivation, one was untilled except for two seasons, one was tilled during most of the experiment, and the remaining two were given annual cultivation. In the two most responsive orchards—in both cases orchards receiving no cultivation—nitrogen has been most influential in improving both yield and growth. It has also shown important benefits in these respects in five of the six experiments. Where nitrogen has proved beneficial, its influence has shown no signs of reduction at the close of the ten-year period.

The addition of phosphorus or potash to nitrogen applications has usually given larger returns than nitrogen alone. However, in three of the orchards, the addition of phosphorus has resulted in no important benefit. Neither phosphorus nor lime, when used alone, has shown any important influence on yield or growth in apples. Potash has increased the yields materially in three of the experiments and apparently shown some value in increasing the average size of the fruit. It has also apparently had an injurious effect in two experiments. In a comparison of carriers, no important difference has appeared in ten years between the various forms of potash. The same is true in part of phosphorus, although at present the evidence favors the acid phosphate, at least in the absence of tillage. The distinctly retarding influence of nitrogenous fertilizers and manure on color is due to delayed maturity. In these experiments, fertilization has usually had very little influence on the average size of the fruit. This is apparently because it acted primarily in increasing the total amount of fruit and foliage on the tree, both of which influences tended to decrease the average size of the fruit. Manure, however, usually secured a fair increase in size, probably chiefly because of its moisture-conserving effect. In one orchard—that tilled during most of the experiment—no type of fertilization has yet given a profitable return. In general, the author has been unable to find any definite correlation between soil composition, as ascertainable by the ordinary chemical means, and the actual response of the associated trees to additional fertilization.—R. D. Anthony.

57. WICKS, W. H. The effect of cross-pollination on size, color, shape, and quality of the apple. Univ. Arkansas Agric. Exp. Sta. Bull. 143: 1-32. Pl. I-IX (V-IX colored). Mar., 1918.—Technical. Three year's data are given on the effect on the size, color, shape, and quality of reciprocal crosses between Jonathan, Ben Davis, Winesap, and Grimes Golden apples. A total of 11,290 hand pollinations, producing 773 apples, were made. No effect on the characters studied could be seen due to any of the crosses. Some varieties showed under developed and unevenly developed apples due to imperfect pollination. Where pollination was complete no influence of the male parent could be noted. Greatest affinity was exhibited between: Ben Davis (female) × Grimes, Grimes (female) × Jonathan, Grimes (female) × Ben Davis, Ben Davis (female) × Jonathan. The facts obtained are said to justify the planting of varieties primarily for the benefits of cross-pollination.—John A. Elliott.

MORPHOLOGY, ANATOMY AND HISTOLOGY

E. W. SINNOTT, *Editor*

THALLOPHYTES

58. DRECHSLER, CHARLES. Morphology of the genus *Actinomyces*. Bot. Gaz. 67: 65-83, 147-168. Pl. 2-9, 112 fig. 1919.—Author reviews previous work on this genus and describes the technique which he has developed. The vegetative thallus of *Actinomyces* consists of a mycelium of profusely branching hyphae which attain a much greater extent than the branching figures recorded for bacteria of the acid-fast group. The hyphae are not uniform in diameter. The aerial mycelium usually occurs in the form of a mat with the fructifications distinct, but in some species the fructifications are combined to form erect sporodochia. The individual fructification consists of a sterile axial filament bearing branches loosely or in dense heads. The primary branches may be sporogenous or may produce secondary sporogenous branches. Fructifications tend to be either erect and dendroidal or prostrate and tufted. The sporogenous hyphae are usually coiled spirally. Sporogenesis begins at the tips of the fertile branches and proceeds basipetally. The character of the spirals and of the spores provide specific distinctions. Granules, nuclear in appearance, occur in many spores. The author describes and discusses the occurrence of metachromatic granules in the sterile hyphae, of distensions, and of certain spherical structures. He rejects the theory that *Actinomyces* is transitional between the Hyphomycetes and the Schizomycetes, since it shows no well defined bacterial characteristics (aside from its minute size, which he regards as unim-

portant); and casts doubt on the value of the "acid-fast" staining reaction in mycological research. He believes that the genus should be placed unqualifiedly among the Hypomyces. Seventeen morphologically distinct types are described. [See Bot. Abstr. 2, Entry 995.]—E. W. Sinnott.

59. GEORGEVITCH, P. Génération asexuée du *Padina pavonia* Lamour. [The asexual generation of *Padina pavonia* Lamour.] Compt. Rend. Acad. Sci. Paris 167: 536-537. 1915.—The primary cell giving rise to the tetrasporangium is called the rudiment of a tetrasporangium. It divides into a smaller basal cell, and a larger dome-shaped superior cell, which is the tetraspore mother cell. The nucleus of the latter passes into synapsis and a little later chromosomes become organized. During these processes the nucleolus remains visible but the centrosomes cannot be detected until the last-named stage is reached. At this time also a central intranuclear spindle makes its appearance. It consists of 5 or 6 double fibers extending from pole to pole. At the metaphase which follows 24 chromosomes may be counted 12 later going to each end of the spindle, respectively. Quadripartition of the cell succeeds the second nuclear division.—C. H. Farr.

60. HARPER, R. A. Organization, reproduction and inheritance in *Pediastrum*. Proc. Amer. Phil. Soc. 57: 375-439. 2 pl., 35 fig. 1918.—A continuation of the author's studies on problems of organization in colonial algae. A detailed account is presented of development and inheritance in various species of *Pediastrum*. Cell form is due in part to heredity and in part to environmental pressure and contact relations between cells. The inheritance of cell form is not direct, as is the inheritance of green color, but is indirect; since the germ cell is simple and undifferentiated and develops the typical form of the adult cell only as a result of ontogenetic development. Cell form seems to be the direct expression of the organization of the cell as a whole rather than dependent on chromosomal determiners. Neither does the author believe that the characters of the colony as a whole are due to factorial dispositions in the germ cell but regards them instead as dependent directly on the interactions of the "form, polarities, adhesiveness, surface tension, etc., of the individual cells." Evidence is brought forward that each cell has a biaxial polarity and a specific orientation in the colony. Author discusses the relation of heredity and of environment to morphogenesis in this genus. [See Bot. Abstr. 2, Entry 27.]—E. W. Sinnott.

61. HARPER, R. A. The evolution of cell types and contact and pressure responses in *Pediastrum*. Mem. Torrey Bot. Club 17: 210-240. 27 fig. 1918.—An evolutionary study of the various subgenera of *Pediastrum* with especial reference to the problems of morphogenesis involved. The manner in which the more complex types have arisen from the simpler ones is suggested and the existence of orthogenetic tendencies in most of the subgenera is noted. The relations between the characters of the cell and the characters of the colony are studied. In order to form a rounded least-surface contour for the colony, the individual cells must lose in part their own tendency to assume the least-surface form owing to contact with other cells; and this irregular cell form has apparently become fixed by heredity so that it now appears even when the cell grows quite freely. The type pattern of the colony is based on the polarity of the swarm spores and their sensitiveness to contact and pressure stimuli, and not to any factors of mosaic inheritance spatially differentiated in the organization of the mother cell. This polarity of the cells and their capacity to respond to contact and pressure stimuli have probably increased during the evolution of the genus. The gradual construction of a symmetrical colony from a mass of free-swimming swarm spores the author believes not to be due primarily to the physical principles of surface tension, adhesion, mutual pressure, etc., alone, nor to a "mysterious controlling and adaptive principle of behaviour," but rather to interactions between polarized cells highly sensitive to contact and pressure stimuli.—E. W. Sinnott.

62. HARPER, R. A. Binary fission and surface tension in the development of the colony in *Volvox*. Mem. Brooklyn Bot. Garden 1: 154-166. 1 pl., 4 fig. 1918.—Volvox has advanced

beyond such forms as *Gonium* in the direction of a typical metaphytic habit in (1) the tenacity with which the cells of the colony adhere to one another, (2) the growth of the germ cells and daughter cells to relatively large size between successive divisions and (3) the possession of differentiated germ and somatic cells. The author discusses the morphogenesis of the *Volvox* colony on the basis of interactions between surface tension, adhesion and binary fission. "The facts as known are certainly quite in harmony with the view that such presumably easily influenced factors as adhesion and surface tension, combined with the more fundamental and ever-present incompatibility between the principles of binary fission and least surfaces, may be of determining significance in the transition from the plate-shaped to the three-dimensional globular form of colony with all its evolutionary significance."—E. W. Snodell.

63. MOREAU, FERNAND M., AND MME. FERNAND. Étude cytologique du développement de l'apothécie des *Peltigéracées*. [A cytological study of the development of the apothecium in the *Peltigera* acceae.] Compt. Rend. Acad. Sci. Paris 166: 178-179. 1918.—According to authors, asci of *Peltigera* are formed from ascogonia which in *Solorina* arise in the algal layer and in *Peltigera* and *Peltidea* in the medullary layer. The ascogonia are formed from long, isodiametric cells which are at first uninucleate and later multinucleate. Much later the ascogonia give rise to multinucleate ascogenous hyphae, the cells of which very soon become binucleate. The ascogenous hyphae branch and rebranch and the terminal cells form the asci. The two nuclei of terminal ascogenous cell fuse. Resulting nucleus undergoes three divisions. In *Peltigera*, *Peltidea*, and *Nephromium* each nucleus becomes the nucleus of a spore and later divides two or more times to form the nuclei of the pluriseptate spore. In *Solorina saccata* eight nuclei are formed as with the others mentioned but only four participate in spore formation, the other four nuclei disintegrating in the epiplasm. The resulting four spores become bicellular at maturity. Neither fecundation by spermatia and antherozones nor a fusion of nuclei preceding that of the ascus were observed.—F. A. McAllister.

64. SEAVER, F. J., AND W. T. HORNE. Life-history studies in *Sclerotinia*. Mem. Torrey Bot. Club 17: 202-207. Pl. I. 1918.—A *Sclerotinia* found on rootstocks of *Geranium macranthum* led to a fruitless search for the imperfect stage on living portions of the plant; a *Botrytis* was however isolated from diseased rootstocks when placed in a moist chamber. Cultural studies were then carried out in an effort to connect the *Botrytis* with the perfect stage. Vigorous growths were easily obtained on sterile potato plugs. Cultures made from single ascospores soon gave rise to a *Botrytis*, and comparisons showed the two to be identical. Inoculations were now made using sterile rootstocks and in a few days similar *Botrytis* spores were obtained from each inoculation. Rootstocks are retained in hopes of later securing the perfect stage. Results indicate connection of the *Botrytis* with the *Sclerotinia*, and as the fungus does not fit any found description, it is listed by the authors as a new species, *Sclerotinia (Sclerotinia) Geranii* Seaver and Horne. [See Bot. Absts. 1, Entry 785.]—E. M. Gilbert.

BRYOPHYTES

65. EVANS, A. W. The air-chambers of *Grimaldia fragrans*. Bull. Torrey Bot. Club 45: 235-251. 14 fig. 1918.—There are several tiers of air chambers in the thicker portions of the thallus of *Grimaldia*, and the author states that these are all connected by openings of various sizes. The outer chambers are usual open externally by regular pores. The upper chambers are more or less divided by irregular partitions which are poorly developed in the lower chambers, or may be quite absent. Except for short, tooth-like outgrowths of the partition walls of the dorsal chambers, there is nothing corresponding to the green filaments found in the air chambers of *Marchantia* and several other genera. The chambers all owe their origin to splitting of the cell walls in originally solid tissues. This splitting may begin below the surface of the thallus, or it may start at the surface and extend inwards. The dorsal chambers form first, the inner ones somewhat later. The secondary increase in size of the chambers is due almost entirely to growth of the bounding cells, and only slightly to

further splittings of the cell walls. "The system of united cell-plates in the dorsal chambers and the partitions between the chambers, increase in vertical height simultaneously. Direct outgrowths from the surfaces of the cell plates play a very small part in the process of subdivision."—D. H. Campbell.

SPERMATOPHYTES

66. HIRASE, SAKUGORO. *Nouvelles recherches sur la fécondation et l'embryogenie du Ginkgo biloba.* [New studies of fertilization and embryogeny in *Ginkgo biloba*.] Bot. Mag. Tôkiô 32: 83-108. 1 pl. 1918. [Japanese. Summary in French in same vol. p. 139-143.]—Author reviews the various investigations and opinions concerning origin of the drop of liquid found in the so-called archegonial chamber of *Ginkgo* and cycads. He dissected out the female gametophytes just prior to fertilization and placed them in moist chambers. In this way he was able to observe that a number of minute droplets were formed on the endosperm (female gametophyte) just outside the border of the archegonial chamber. In from ten to twenty hours these attained such size that they fused and sufficed to fill the chamber. If chloroform vapors were introduced into the saturated atmosphere the drops formed within three to six minutes. Osmic acid fumes entirely suppressed the secretion. That this secretion was not a mere condensation of water from the saturated atmosphere was shown by employing younger gametophytes, in which case no droplets at all were formed. Just before entrance of pollen tube into archegonial chamber, the upper part of the egg forms a large vacuole which serves the purpose of a "receptive chamber" for the sperm. Some of the liquid from this vacuole oozes out between the neck cells and becomes mixed with the secretion filling the archegonial chamber.—L. L. Burlingame.

67. ARTSCHWAGER, ERNST F. *Anatomy of the potato plant, with special reference to the ontogeny of the vascular system.* Jour. Agric. Res. 14: 221-252. Fl. 27-47, 4 fig. 1918.—The vascular topography of the root, stolon, tuber, stem, leaf and flower of *Solanum tuberosum* is presented in detail; the ontogeny of the vascular tissues thoroughly worked out, and the activity of the cambium described. The protoxylem matures before the protophloem, contrary to the usual condition in higher plants. The inner phloem groups of the characteristic bicollateral bundles often occur near center of stem. Their character and position is discussed. The branching and anastomosis of the phloem groups, both inner and outer, is described. A considerable amount of secondary wood is formed, and author calls attention to the large amount and probably important function of the secondary phloem. The observations of Reed on tuber formation are in general confirmed, but author believes that it is the perimedullary zone rather than the pith which forms most of the tuber. Periderm is formed both by hypodermis and epidermis.—E. W. Sinnott.

68. DAVIE, R. C. *On the leaf-trace in some pinnate leaves.* Trans. Roy. Soc. Edinburgh 52: 1-36. 1 pl. 1918.—Paper based on a comparative study of the leaf trace of several Ferns, Cycads, Monocotyledons and Dicotyledons. Conclusion is reached that factors controlling form of leaf-trace and its system of branching are: (a) systematic position, (b) length of leaf and size of its appendages, (c) order of development of the pinnae, and (d) type of vascular system found in the stem.—J. H. Faull.

69. MORVILLEZ, F. *La trace foliaire des Chrysobalanées.* [The foliar trace of the Chrysobalanaceae.] Compt. Rend. Acad. Sci. 166: 859-861. 1 fig. 1918.—Eight types of leaf traces from different species of Chrysobalanaceae are described and figured. They show degrees of development from very simple to complex. They do not show very close affinity with leaf traces of other Rosaceae but present a curious likeness to those of Caesalpinoideae. Hence, since Chrysobalanaceae seem to stand about equally distant from Rosaceae and Leguminoae, author considers that they should form a small independent family.—Eloise Gerry.

70. MORVILLEZ, F. *La trace foliaire des Légumineuses-Caesalpiniées.* [The foliar trace of the Caesalpinoideae.] Compt. Rend. Acad. Sci. Paris 167: 205-208. Fig. 1-9. 1918.—Nine

types of leaf trace are figured and discussed. The results differ from those of Petit (1887). The different appearance of the leaf trace at different heights is pointed out. These leaf traces are, however, related naturally by many common characteristics. They also show certain structures analogous to structures pointed out by the author in the leaf traces of the Rosaceae and Chrysobalanaceae respectively and, in addition, structures showing affinities with those which are found in other sub-families of the Leguminosae.—*Eloise Gerry.*

71. MORVILLES, F. *L'appareil conducteur des feuilles des Saxifragacées.* [The conducting system of the leaf in the Saxifragaceae.] *Compt. Rend. Acad. Sci. Paris* 167: 555-558. Fig. 1-9. 1918.—The characteristics of the conductive structures of the different Saxifragaceae were found to correspond closely to the tribal divisions established morphologically. Representatives of eight tribes are discussed and the disposition of the bundles illustrated by nine text figures. The author concludes that leaf traces with the numerous different regions best defined are found in the tribes with superior ovaries. In those with the ovary generally inferior the leaf trace tends to be reduced to a simple arc; in the forms of this group with opposite leaves vestiges of the other type of bundle arrangement are found but in the tribes with alternate leaves these vestiges are lacking. In certain genera most marked affinities with the leaf traces of the Rosaceae and also certain similarities to those of the Leguminosae were noted. A further likeness of the Saxifragaceae to the Rosaceae was the reduction of the leaf trace to an open arc, in certain types with inferior ovaries, which the author has found in both families.—*Eloise Gerry.*

72. SMALL, J. *The origin and development of the Compositae. Chapter IV. The corolla.* *New Phytol.* 17: 13-40. Fig. 8-10. 1918.—Previous literature dealing with the corolla of the Compositae is fully reviewed. Fundamental form of corolla is taken to be tubular, with a campanulate upper region and five equal lobes. This, author thinks, gave rise by a mutation to the five-toothed ligulate form characteristic of the Cichorieae. Another mutation led to the appearance of laticiferous vessels in this tribe. The bilabiate corolla characteristic of the ordinary ray floret of the tribes other than the Cichorieae (the inner lip being, however, storted as a rule) is derived from the tubular type, and from it in turn, by an elongation of tube and a reduction in lips, came the filiform type which is very narrowly tubular without the terminal expansion into a limb. The differences which characterize the mature corollas arise at an early stage, and are based upon differences in the behavior of the two posterior petals. Attempts to modify experimentally the form of the developing corolla were largely unsuccessful. Flower colors of the various tribes are discussed on the assumption that green, yellow, orange, and white are primitive; red, purple, violet, and blue more advanced. The vascular anatomy of the tubular and ligulate corollas is constant; that of the bilabiate corolla is as variable as the external form of this type. These studies of the form, development, color, and anatomy of the corolla confirm, with a few modifications, the phyletic conclusions previously reached upon other grounds.—*C. E. Allen.*

73. SMALL, J. *The origin and development of the Compositae. Chapter V. The pappus.* *New Phytol.* 17: 69-94. Fig. 11-18. 1918.—From the evidences presented by previous writers, and from his own observations, author concludes in favor of the trichome nature of the Composite pappus, holding that the foliose calyx limb, when it occurs teratologically, is a reversion to a pre-Composite ancestor. The setose-scarbid type of pappus, composed of fused uniseriate rows of cells with the obtuse terminal cell of each row free and projecting for a short distance, is considered primitive. Modifications of this give a series of setose types; by lateral fusions of the setae a series of paleaceous forms is produced, and fusion of the setae in clumps gives the aristate types. Short, ring-shaped types result from reduction of either paleaceous or aristate forms. Cohesion and reduction are ruling factors in the evolution of the pappus, as in that of other parts of the flower. Distribution of the various pappus types in the tribes of the Compositae is discussed at length. The dominance of the most primitive forms in *Senecio* confirms this as the basal genus. In general, this study gives results as to phyletic relationships agreeing with those derived from the study of other floral structures

and also, the author thinks, furnishes valuable indications of the more detailed evolution of certain groups such as the Vernoniaceae, Eupatoriaceae, Cynareae, and Mutisiaceae.—C. E. Allen.

74. SMALL, J. The origin and development of the Compositae. Chapters VI (The involucre), VII (The receptacle), and VIII (Phyllotaxis of the Compositae). New Phytol. 17: 114-142. Fig. 19-24. 1918.—The complete involucre of the Compositae usually includes an inner pericline, consisting of bracts which have, or have probably had, florets in their axils and a calyculus, developed from cauline leaves. Author concludes that the capitulum arose from a racemose umbel by an abortion of its pedicels; the bracts of the outer flowers formed a uniseriate pericline, and an aggregation of cauline leaves immediately below the inflorescence produced the calyculus, at first composed of a few scattered members. Progressive sterilization of the floral bracts resulted in a pluriseriate pericline, and progressive aggregation and reduction of cauline leaves gave a denser, pluriseriate calyculus. Distribution of involucre types within the family follows in general the same phyletic lines as does that of floral and other characters studied.—The receptacle is of little phyletic value, but furnishes evidence in favor of origin of several tribes already suggested on other grounds. Primitive receptacle is held to be flat or nearly so, having a foveolate structure and with a tendency to reversion to a pre-Composite ancestor evidenced by the occasional appearance of paleae in the positions of bracts. A progressive development of ridges between depressions in the surface of the receptacle resulted in appearance of other types of receptacle such as the setiferous and the alveolate. Alternate arrangement of leaves seems to be the primitive condition in the Compositae. This is found in the primitive Senecioninae, with occasional reversions to the opposite-leaved condition probably characteristic of a very distant ancestor. The Helianthereae although advanced in all their floral characters, show a marked atavistic tendency in their phyllotaxis as well as in other respects. A study of the phyllotaxis of the capitulum shows the calyculus more nearly akin to the cauline leaves than to the periclinial bracts and confirms the distinction drawn between pericline and calyculus; proves the number and position of ray florets to be primarily dependent on the bracts of the pericline; and shows that the uniseriate type of ray is primitive for radiate capitula.—C. E. Allen.

75. SMALL, J. The origin and development of the Compositae. Chapter IX. Fruit dispersal in the Compositae. New Phytol. 17: 200-230. Fig. 25-28. 1918.—A consideration of published work shows, author thinks, that a number of Compositae are regularly dispersed by wind to distances of 4 to 20 miles, and that pappose fruits are occasionally carried as much as 100 miles. Experiments with a specially devised apparatus in which fruits of various Compositae were subjected to air currents of measured pressure showed that air pressures much lower than those assumed by previous writers suffice to carry the fruits for considerable distances. Thus a pressure equivalent to a wind velocity of 2.06 miles per hour carried a fruit of *Taraxacum officinale* immediately through and out of a horizontal tube 125 cms. in length; and at a velocity of 1.01 miles per hour the same fruit was carried laterally to a distance equal to that of the vertical fall. A theoretical consideration of the hydrodynamics of wind dispersal, in connection with these experimental results, leads to the conclusion that the relative humidity of the air being not above 0.77, a horizontal wind with a velocity of 1.97 miles per hour is sufficient for the dispersal of *Taraxacum* fruits to any distance. If the humidity is greater, the pappus closes and the fruit drops rapidly. The minimum wind velocity for fruit dispersal is estimated for other species as follows: *Senecio vulgaris*, 1.25 miles per hour; *Centaurea imperialis*, 7.3 miles per hour; *Ursinia speciosa*, 2.47 miles per hour; *Leontopodium alpinum*, 4.4 miles per hour. Given a low relative humidity and a wind above the minimum velocity for dispersal of the particular species blowing steadily in the same direction over a large stretch, the author holds that the ordinary pappose fruit can be blown many hundreds of miles over land or sea. It follows that hypothetical land bridges are not necessary to explain the present distribution of the Compositae.—C. E. Allen.

76. WEATHERWAX, P. The evolution of maize. Bull. Torrey Bot. Club 45: 309-342. 36 fig. 1918.—The tribe Maydeae is divided into two classes, and discussion is confined to the three

American genera, *Zea*, *Euchlaena*, and *Tripsacum*, which bear evidences of close relationship and are classed together. The morphology of the three genera is discussed, and is made the basis for the new theory of the evolution of maize which author proposes, after reviewing theories now in vogue and showing their fallacies. Discussion may be summarized as follows: (1) Vestigial organs being considered, *Zea*, *Euchlaena*, and *Tripsacum* are identical in structural plan. Present aspect of each is due to suppression of parts present in a primitive ancestor having perfect flowers borne in one type of inflorescence. (2) The ear of maize is the homologue of the central spike of the tassel. No morphological evidence supports the view that either of these organs originated in the fusion of more simple parts, and there is in no one of the genera here considered any organ the like of which could have united to form either the ear or the central spike of the tassel. (3) The prevailing theory that maize is a species of hybrid origin has little to suggest it when maize and its near relatives are thoroughly understood, and it is not in harmony with the most significant facts of morphology. It seems much more probable that *Zea*, *Euchlaena*, and *Tripsacum* have descended independently from a common ancestral form now extinct. [See Bot. Absts. 1, Entry 503; 2, Entry 35.]—V. A. Pease.

77. BEAUVERD, M. C. *Monographie du genre Melampyrum*. [A monograph of the genus *Melampyrum*.] Mém. Soc. Phys. et Hist. Nat. Genève, 38^e: 1918.—An intensive study of the genus *Melampyrum*, of which 14 species are recognized, widely distributed in the northern hemisphere. There are 4 areas of distribution; a North American; an Eurasian; an eastern Mediterranean, and a Far East or Chinese and Japanese area. Author has studied in the field the range of variation of species and forms and by careful microscopic study of details of flower has convinced himself of relative value of fixed qualitative and variable quantitative characters in the discrimination of the species. There is a résumé of previous work, a treatment in detail of the morphology of the vegetative and reproductive organs and another chapter, entitled "Biological notes," which deals with pollination, distribution of seeds by aid of ants, and some ecological notes based upon author's own observations. [Through review in Nature 102: 115-116. 1918.]—F. Grace Smith.

78. ALVARADO, S. *Plastosomas y leucoplastos en algunas fanerogamas*. [Plastosomes and leucoplasts in certain phanerogams.] Trab. Museo Nacion. Cienc. Nat. Madrid Ser. Bot. No. 13. 1918. [Note by L. DUFOUR in Rev. Gén. Bot. 30: 333-334. 1918.] The plastosomes (chondriosomes) were studied chiefly in the root of *Cicer arietinum*. They are small bodies which may be united into filaments but without losing their individuality, and may again be separated. They are transformed into leucoplasts by a chemical modification without change of form. This transformation occurs in plastosomes in any part of a meristematic cell; in differentiated parenchyma cells, only in perinuclear plastosomes. The number of leucoplasts is increased, not by their division, but only by transformation of additional plastosomes. Starch is formed both in plastosomes and in leucoplasts. In either case the body in question is completely changed into starch.—C. E. Allen.

79. GRAHAM, MARGARET. *Centrosomes during early fertilization stages in Preissia quadrata*. Mem. Torrey Bot. Club 17: 323-325. 1918.—After the egg and the antherozoid have united and before the two nuclei fuse, the cytoplasm is differentiated into an inner granular zone and a peripheral vacuolar zone. In the former region are to be found two centrosomes, at first very near together; but as the antherozoid nucleus enlarges they separate and take up positions at the two poles, respectively. The rays are few and very long. Material was fixed in a modified Flemming solution.—C. H. Farr.

80. GUILLIERMOND, M. A. *Sur l'origine mitochondriale des plastides*. [On the mitochondrial origin of plastids.] Compt. Rend. Acad. Sci. Paris 167: 430-433. 1918.—Issue is taken with the theory recently supported by Mottier which holds that the plastids are not formed from mitochondria, but that they arise only by division and that they exist in germinal and undifferentiated cells as structures much resembling mitochondria. Evidence

against this theory is found in observations of several types of cells. Author believes it has been demonstrated that pigment bodies of animal cells are formed from mitochondria, and hence by analogy that plastids of plants must arise in the same fashion. It is found in young stems of eucurbits that the amyloplasts arise from chondriocentes. These occur in the same cells as the granular mitochondria, and in the tuber of the potato the latter may also produce amyloplasts. The two types of chondriosomes are held to be genetically related, as is shown in the embryo sac mother cell of the Liliaceae. Author regards interpretation of Mottier to be based on lack of recognition of occurrence of two kinds of mitochondria.—C. H. Farr.

81. MOTTIER, D. M. Chondriosomes and the primordia of chloroplasts and leucoplasts. *Ann. Bot.* 32: 91-114. 1 pl. 1918.—Two kinds of structures frequently occur in the cytoplasm of plant cells which have by some investigators been included under the term chondriosomes. These are chondriosomes proper, and the primordia of plastids. Both divide by constriction and in some cases are so similar as to be indistinguishable, although the latter are frequently thicker rods. These enlarge and become chloroplasts or leucoplasts, while the true chondriosomes remain unchanged. These stages of development are traced in successive cells beginning at the meristem in root tips and at the apical cell of the thallus in *Marchantia*. In this genus very large chondriosomes and an absence of chloroplasts are to be noted in the mucilage-producing hairs on the ventral scales, in the young rhizoids and in spermatogenous tissue. The primordia of plastids are not demonstrated in these cells, but it is believed that they are present in all germinal tissue at least. A study of *Anthoceros*, with only one chloroplast, demonstrates that the chondriosomes are not disorganized chloroplasts and that they resemble somewhat the pyrenoids. In *Adiantum*, products of the plastids stain differently from the chondriosomes. *Elaeodea* was studied for comparison with other workers. It is concluded that the chondriosomes and primordia of plastids as well as the nucleus are transmitted in sexual reproduction and are bearers of hereditary characters.—C. H. Farr.

PALEOBOTANY AND EVOLUTIONARY HISTORY

EDWARD W. BERRY, *Editor*

82. ANTEVS, E. Some corrigenda. *Geol. Fören. Förhandl.* 40: 892-893. Nov., 1918.—Contains corrections of statements made in the author's paper on the post-glacial marine history of Bohuslän and reports the following fossil plants from the submerged peat bog at Kongedybet in Denmark: *Corylus avellana*, *Cornus sanguinea*, *Crataegus*, *Betula*, *Myrica*, *Viburnum opulus*, *Alnus glutinosa*, *Populus tremula*, *Rhamnus frangula*, *Ranunculus repens*, *Spiraea ulmaria* and *Phragmites communis*.—Edward W. Berry.

83. BERRY, EDWARD W. *Eucalyptus* never present in North America. *Science* 49: 91-92. 1919.—Comments on the origin and distribution of the Myrtaceae and concludes that the fossil forms from North America identified as *Eucalyptus* represent the ancestral stock of *Myrcia* and *Eugenia*. Suggests that the non-committal name *Myrtophyllum* be used for *Eucalyptus*-like leaves of uncertain generic relationship within the family Myrtaceae.—Edward W. Berry.

84. BERRY, EDWARD W. The fossil higher plants from the Canal Zone. *U. S. National Mus. Bull.* 103: 15-44. Pl. 13-18. Jan., 1919.—An account of the fossil vascular plants discovered during the geological studies of the Canal Zone. The deposits containing plants are for the most part tuffs and the materials are usually poorly preserved. They include fragments of a fern thought to represent *Acrostichum*, two undetermined palms represented by leaves and a third represented by wood, and 16 species of dicotyledons represented by leaves and fruits. The petrified palm, *Palmoxylon palmifolius* and an abundant petrified leguminous tree, *Taeniozylon multiradiatum*, are common to the Oligocene of the Island of Antigua.

With these two exceptions together with the euphorbiaceous species *Hieronymia Lehmanni* * common to the Tertiary of Ecuador, and *Guatteria culebrensis* n. sp. which has subsequently been found in the lower Miocene of northern Peru, the species are not known outside of the Panama region and are new to science. The petrified fruits of a new species of ebony, *Diospyros Macdonaldi* are thought to be of Eocene age. The balance of the material is of Oligocene and lower Miocene age and comprises the following: *Ficus culebrensis*, *Myristicophyllum panamense*, *Inga oligocenica*, *Cassia culebrensis*, *Hiraea oligocenica*, *Banisteria praenuntia*, *Schmidelia bejuconensis*, *Mespilodaphne culebrensis*, *Calyptanthus gatunensis*, *Melastomiles miconioides*, *Rondeletia goldmani*, and *Rubiaceites izoreoides*.—Edward W. Berry.

PATHOLOGY

DONALD REDDICK, Editor

85. ANONYMOUS. L'inspection phytopathologique des Etablissements agricoles, horticoles et viticoles (Communique). [Phytopathological inspection.] Rev. Vit. 48: 93-94. 1918.—Official order from the French Minister of Agriculture.

86. BERNATSKY, J. Anleitung zur Bekämpfung der Peronospora des Weinstockes nach den neuesten Erfahrungen und Versuchsergebnissen. [Guide for control of *Peronospora viticola* according to latest experience and investigation.] Zeitschr. Pflanzenkr. 28: 1-28. 1918.—Elementary treatise touching minutely on the details considered of importance in controlling downy mildew. Cultural practices of importance include: air drainage by weeding and by using only low-growing intercrops; prompt hardening of tissues by use of potash, lime, etc., and avoidance of nitrogenous fertilizers; also avoidance of summer pruning which forces new growth; proper pruning and summer tying to keep clusters and shoots well off the ground.

Really resistant varieties do not exist and one of the finest varieties, Chasselas, is most susceptible.—One to six treatments with prophylactic spray are required depending on raininess of the season. Details about apparatus and materials, preparation and use of Bordeaux mixture, care of machinery, etc.—When primary lesions appear treatment should be begun. Enough labor should be at hand to do the work promptly. Italian prisoners are apt at spraying. Russians are not so good.—When blue vitriol is an exorbitant price, "peroxid" may be substituted. Review of European experience with this material indicates that 1.5 per cent "solution" is effective. Silver salt of nucleic acid and zinc sulfate with lime may be substituted. The latter material is effective in years of mild attack but does not adhere well, clogs nozzles, and if used late injures the must.—Proprietary copper mixtures are condemned.

Great emphasis placed on importance of covering every cluster and every leaf.—In small vineyards the leaves showing primary infection may be plucked and burned.—D. Reddick.

87. CAPUS, J. Comparaison entre les effets des bouillies cupriques basiques et des bouillies acides. [Comparison of the effects of copper mixtures and acid mixtures on mildew of the vine.] Compt. Rend. Acad. Agric. France 4: 86-90. 1918.—Acid and basic mixtures are equally efficacious against downy mildew of the vine (*P. viticola*), but for a period exceeding 20 days and during heavy rains, basic mixtures retain their efficacy better than acid ones. [Abst. in Internat. Rev. Sci. Pract. Agric. 9: 629-630. 1918.]—D. Reddick.

88. CAPUS, J. Le mildiou. [Downy mildew of grapes.] Rev. Vit. 48: 65-71. 1918.—Essentially a restatement of the facts discovered by author and others on relation of rains of various durations to infection by *Plasmopara viticola*, their relation to time of treatment, effect on the fungicides etc. Citations of conditions since 1901.—D. Reddick.

89. CAPUS, J. Sur la maladie vermiculaire des pois dans la Gironde. [Nematode disease of peas in Gironde.] Compt. Rend. Acad. Agric. France 4: 712-715. 1918.—*Heterodera schachtii* is the chief cause of drying out of roots and gradual death of plants from base. Disease is serious in Gironde. *Fusarium vasinfectum* var. *pisi* is commonly present but is thought

usually to follow injury by nematodes and other agents.—Practice of fall-sowing of peas and of following peas with peas accounts for unusual prevalence in the region.—*Sclerotinia libritiana* has been observed to cause similar symptoms.—D. Reddick.

90. CLINTON, G. P. Report on fungous diseases of 1917. Rept. Conn. Veg. Grower's Assoc. 1917: 14-15. 1918.

91. CLINTON, G. P., AND W. E. BRITTON. Spray calendar. Connecticut Agric. Exp. Sta. Bull. 199: 53-98. 1918.—A brief illustrated account of the diseases and insect injuries of plants cultivated in Connecticut.

92. COOK, M. T. Common diseases of berries. New Jersey Agric. Exp. Sta. Circ. 88. 12 p., 8 fig. (Revised.) 1918.—Symptoms, cause and control of the more common diseases of blackberries, raspberries, dewberries, gooseberries, currants, strawberries, and cranberries are discussed in a popular way.—L. M. Massey.

93. COOK, M. T. Common diseases of garden vegetables and truck crops. New Jersey Agric. Exp. Sta. Circ. 89. 24 p., 12 fig. (Revised.) 1918.—A brief and popular discussion of symptoms and causes of diseases of garden vegetables and truck crops, together with specific and general recommendations for control.—L. M. Massey.

94. COOK, M. T. Common diseases of shade and ornamental trees. New Jersey Agric. Exp. Sta. Circ. 98. 27 p., 11 fig. 1918.—Brief, popular discussion of the more common diseases of shade and ornamental trees under the headings of root, stem and foliage troubles, with recommendations for control. Attention is directed to the undesirable features of some trees; mechanical injuries and those resulting from fires, salt poisoning, gas, fumes and freezing; and to care and cultivation.—L. M. Massey.

95. COOK, M. T. Common diseases of ornamental plants. New Jersey Agric. Exp. Sta. Circ. 97. 23 p., 10 fig. 1918.—Brief popular discussion of the more common diseases of ornamental plants are given, together with recommendations for control.—L. M. Massey.

96. COOK, M. T., AND W. H. MARTIN. Leaf blight of the tomato. New Jersey Agric. Exp. Sta. Circ. 96. 4 p., 1 fig. 1918.—Popular discussion of leaf blight (*Septoria lycopersici*) followed by a brief discussion of results of spraying experiments conducted in 1916 and 1917. In the experiments in 1916 the best results were obtained from using 4:4:50 Bordeaux mixture. In 1917 the standard 4:4:50 Bordeaux mixture gave the highest yield, while the best control of the fungus resulted from the use of a mixture consisting of 4 pounds copper sulphate, 2 pounds lime and 3 pounds resin fish-oil soap to 50 gallons of water. The manner of preparation of the mixtures is given.—L. M. Massey.

97. DRECHSLER, CHARLES. The taxonomic position of the genus *Actinomyces*. Proc. Nation. Acad. Sci. U. S. A. 4: 221-224. 1918.—"There seems to be no adequate reason why the genus should not be classed with the Hyphomycetes." [See Bot. Absts. 1, Entry 775.]

98. GÄUMANN, ERNST. Über die Formen der *Peronospora parasitica* (Pers.) Fries. [The forms of *Peronospora parasitica*.] Beih. Bot. Centbl. 35: 395-533. Fig. 1-47. Sept., 1918.—Morphological and statistical study bearing on the question of species in parasitic fungi.—D. Reddick.

99. HARTER, L. L. Podblight of the Lima bean caused by *Diaporthe phaseolorum*. Jour. Agric. Res. 11: 473-504. Pl. 48-49, fig. 11. 1917.—Podblight is a common and destructive disease of the Lima bean (*Phaseolus lunatus* L.) occurring both on the pods and stems. Previous to the present work only the pycnidial stage (*Phoma subcircinata*) of the causal fungus was known. Although Cooke and Ellis had described *Diaporthe phaseolorum* as occurring on the dead vine of Lima beans, its connection with *Phoma subcircinata* was not established.—The author wintered out vines and pods infected with *Phoma subcircinata* and

Diaporthe phaseolorum later developed thereon. Isolations from single ascospores gave a fungus identical morphologically with *Phoma subcircinata*. The pod blight disease was also produced in a large number of infection experiments by the fungus isolated from the ascospore. A study was also made of the mode of infection, effect of light on, and the relation of temperature to the growth of the fungus. [Abst. by Tobler in Zeitschr. Pflanzenkr. 28: 334. 1918.]—L. L. Harter.

100. HARTER, L. L., J. L. WEIMER, AND J. M. R. ADAMS. Sweet potato storage rots. Jour. Agric. Res. 15: 337-368. Pl. 21-27. 1918.—As a result of several years study sixteen different species of fungi were found to cause rots of sweet potatoes in storage or to reduce their market value. The greatest loss is caused by seven different species of fungi; viz., *Rhizopus nigricans*, *Sphaeronema fimbriatum*, *Diplodia tubericola*, *Diaporthe batatas*, *Plenodomus destruens*, *Sclerotium bataticola*, and *Monilochaetes infusans*. The remaining nine fungi; viz. *Mucor racemosus*, *Alternaria* sp., *Penicillium* sp., *Botrytis cinerea*, *Epicoccum* sp., *Gibberella saubinetii*, *Fusarium culmorum*, *Fusarium acuminatum*, *Trichoderma koningi*, were classed as minor rot producing organisms capable of causing decay only under especially favorable conditions. *Rhizopus nigricans* is well known to be the most destructive of the storage rot fungi. Infections with this organism were difficult to obtain under artificial conditions.—A study was made of the influence of temperature and humidity on infection and subsequent decay by these different species. In all cases with the exception of *Diplodia tubericola* a high relative humidity was found essential. The different species varied considerably in the range of temperature at which they would produce decay. Some of the minor rot organisms, as for example *Mucor racemosus*, *Fusarium culmorum* and *F. acuminatum*, decayed the sweet potatoes at a temperature considerably lower than that of the optimum temperature for the growth of the fungus.—L. L. Harter.

101. HEADLEE, T. J., M. T. COOK, M. A. BLAKE, AND A. J. FARLEY. Spray calendar for the peach. New Jersey Agric. Exp. Sta. Circ. 94. 4 p., 3 fig. 1918.

102. HEADLEE, T. J., M. T. COOK, M. A. BLAKE, AND A. J. FARLEY. Spray calendar for apples and quinces. New Jersey Agric. Exp. Sta. Circ. 93. 4 p., 3 fig. 1918.

103. ITO, SEIYA. A preliminary report on a late-blight resistant strain of potato. Ann. Phytopath. Soc. Japan 1: 5-8. Fig. 1. 1918.—From a continued field observation in the different soils and climates during many years it may be sufficient to conclude that the new strain, "Ekishirazu," found in Japan, is highly resistant to the late blight. The variety was first imported from a foreign country (France?) in about 1903, and after successive culture during three to six years this highly resistant strain, now known as "Ekishirazu," originated among the progenies of the seedlings. The defect of the strain, however, in its lack of sweetness as compared with the taste of "Snowflake," and does not prove to be resistant to the early blight and rosette.—T. Matsumoto.

104. KILLER, J. Versuche über die Eignung des essigsauren Kupfers zur Bekämpfung des Steinbrandes. [Adaptability of copper acetate for the control of smut.] Zeitschr. Pflanzenkr. 28: 106-109. 4 fig. 1918.—Seed of wheat, barley and oats of crop of 1911 very much injured by treatments for 14 hours with 0.5 per cent solution. This strength kills spores of *Tilletia tritici* very quickly. Later comparisons of copper acetate with formaldehyde, copper sulfate, corrosive sublimate and proprietary preparations ("Uspulun" and "Sublimoform") lead to the conclusion that it may be used for smut control in 0.5 per cent concentration, soaking 16 hours. Germination is retarded as compared with formaldehyde-treated seed but this is more than offset by the fact that disinfecting action is still effective in the soil and this is of importance at times.—D. Reddick.

105. KILLER, J. Wurzelbrandbekämpfungsversuche bei Runkelrüben mit essigsaurem Kupfer im Vergleich mit anderen Beizmitteln. [Control of root rot of beets with copper acetate

as compared with other fungicides.] *Zeitschr. Pflanzenkr.* 23: 109-110. 1 *fig.* 1918.—Following substances tested by treating beet seed in various strength solutions and for varying lengths of time as indicated: Formaldehyde 0.1 per cent for thirty minutes and 0.2 per cent for five minutes, mercuric chloride 0.1 per cent for one hour and 0.2 per cent for five minutes, "Uspulun" 0.25 per cent for eight hours and 0.5 per cent for five minutes, copper sulfate, 0.1 per cent for twelve hours and 1 per cent for five minutes, copper acetate 0.1, 0.25 and 0.5 per cent for twelve hours and 1 per cent for five minutes. Root rot, caused by *Aphanomyces laevis* and *Phoma betae*, appeared in plants from untreated seed to extent of 54 per cent and in plants from treated seed in a range from 34 to 63 per cent, i.e., none of the treatments proved effective. "Uspulun" has been highly recommended for this disease. [Regarding it, see Bot. Absts. 2, Entry 115.]—D. Reddick.

106. LEVINE, ISAAC, AND MICHAEL LEVINE. Malignancy of the crown gall and its analogy to animal cancer. *Proc. Soc. Exp. Biol. Med.* 16: 21-22. 1918.—"In a study reported recently on the influence of X-rays on the development of the crown gall, the writers have come to the conclusion that this growth presents an ideal material for the cellular study of the cancer problem. Dr. Erwin F. Smith, of Washington, considers this parasitic disease of plants to be identical with human cancer to such an extent that, since crown gall is caused by a microorganism, he maintains that all human cancers must be due to the same parasite. It seemed desirable to repeat Smith's experiments from the standpoint of human pathology and this was the object of the present investigation.—A large number and a great variety of plants were inoculated with a pure culture of *Bacterium tumefaciens* and a gross and microscopical study of the resulting crown galls was made. The analysis of the material shows that a certain number of these plant-tumors behave morphologically as well as biologically as benign growths. They grow very slowly, do not interfere with the development of the inoculated plant, and compress but do not injure the neighboring normal tissues. Other crown galls appear to be true malignant tumors. They dwarf the inoculated plant. The parts of the inoculated stem become necrotic above and even below the point of inoculation. Microscopically the galls show invasion and destruction of the neighboring normal tissues. In accordance with the findings of Smith a number of crown galls were obtained containing leafy shoots. Smith considers the latter condition to be analogous to human embryomata. A close microscopical study of the crown gall revealed characteristics which differ materially from the conditions obtained in animal cancer. In the majority of the specimens investigated the entire gall presents a uniform morphological appearance of small, young, undifferentiated cells. In other tumors the central growing part presents the usual appearance of a crown gall, while the periphery shows the development of adult differentiated tissue (parenchyma). This parenchyma is a part of the new growth and not of the normal tissues of the inoculated plant. The same is true of rudimentary organs (conducting system), or even a whole rudimentary organism (leafy shoot), which may appear at the periphery or in other parts of the ordinary crown gall. Such an appearance of highly differentiated tissues subsequently to and as a part of the development of a malignant tumor is unknown in animal cancer.—The conclusion to be arrived at from this study is that a fast developing simple crown gall presents a great deal of analogy to animal cancer and offers an ideal material for the cellular study of the latter condition. On the other hand the structure of the growing central part is identical in practically all the crown galls investigated thus far. It represents therefore only one type in the large group of pathological processes designated under the common name of cancer. It is hardly possible to assert on the basis of the study of the crown gall that all human cancers are formed through the activity of one and same microorganism."—I. Levine and M. Levine.

107. LINT, HENRY CLAY. Seed and soil treatment for the control of potato scab. *New Jersey Agric. Exp. Sta. Circ.* 95. 4 p., 1 *fig.* 1918.

108. MONTEMARTINI. Spora la resistenza delle querce all'oidio. *Riv. Pat. Veg.* 9: 77-79. 1919.—As previously reported by other writers, various American species of oaks

(*Quercus coccinea*, *Q. rubra*, *Q. stellata* and others) were found to be immune to attacks of powdery mildew. Leaves of these resistant American oaks were collected early in September and determinations of nitrogen content, total, soluble and insoluble, were made. It was found that only a little over one-tenth of the nitrogen present was soluble. This agrees with the previously published report of Pantanelli, that in susceptible oaks the soluble nitrogen forms four to seven-tenths of the total nitrogen while in resistant oaks it goes down to three-tenths.—F. M. Blodgett.

109. NISHIMURA, MAKOTO. A carrier of the mosaic disease. Bull. Torrey Bot. Club 45: 219-231. Pl. 7. 1918.—*Solanum aculeatissimum*, apple of Sodom, is susceptible to mosaic, of tobacco, showing typical symptoms. *Physalis alkekengi* fails to show any symptoms upon inoculation with the virus but when the expressed juice of such inoculated plants is used for inoculating susceptible species the disease appears in the usual incubation period and in typical form. Concise experimental data are furnished to support the conclusions.—D. Reddick.

110. SAWADA, KANEYOSHI. A new rust-fungus parasitic on the cultivated rose. [Text in Japanese]. Trans. Sapporo Nat. Hist. Soc. 7: 36-40. Fig. 1-3. 1918.—The fungus forms brown spots scattered on the living leaves, stipules, young twigs, fruits, etc. of *Rosa indica* var. *formosana* grown in Formosa, Japan, and frequently induces great damage in the rose nursery. No spores except teleutospores were observed in the microscopical investigation. From the morphological character of the teleutospores the author proposes for the causal fungus the name *Kuchneola rosae*. The morphological description is given as follows: spores $15-52 \times 4-28\mu$, one-celled, 2-5 forming a chain. This is closely allied to *Kuchneola japonica* found on *Rosa*, but is distinguished by the number of the larger sized teleutospores in a chain. [See Bot. Absts. 2, Entry 784.]—T. Matsumoto.

111. SHIMBO, IFFO. Studies on some insect-galls in Japan. [Text in Japanese.] Bot. Mag. Tokyo 32: 121-128. Fig. 1-3. 1918.—The author gives detailed descriptions of morphology of two insect-galls found in Japan, (1) on the leaves of *Illicium anisatum* and (2) on the leaves of *Machilus thunbergii*. The distribution of starch, sugar, protein, fat, tannin, inorganic salts and certain enzymes in the tissue of both diseased and healthy leaves is also reported. From the experiment it is inferred that tannin, starch and sugar are a little more concentrate in gall-tissue of *Illicium* than in healthy tissue. No crystals of calcium oxalate are observed in the gall-tissue. The life-history of the causal insects and the nature of the parasite fungi in the galls is also described to a certain extent.—T. Matsumoto.

112. STAKMAN, E. C., AND A. G. TOLAAS. The control of brown rot of plums and plum pocket. Minnesota Hort. 46. May, 1918. [Illustr.]—Brown rot of plums, which is serious in Minnesota nearly every year, is discussed and satisfactory methods of control are outlined. Plum pocket (caused by *Exosacus pruni*), which has been under investigation at the Minnesota Experiment Station for about five years, is more difficult to control than brown rot. Recommendations for the control of plum pocket are given, as follows: (1) Destroy all mummified plums; (2) prune out and burn affected twigs; (3) spray with either Bordeaux mixture, 3-4-50, or lime-sulfur 1-40, as for brown rot. An application made when the flowers are just beginning to show color seems essential. It is suggested that a dormant spray be tried.—L. R. Hesler.

113. STRICKLAND, F. L., AND N. I. PEET. The spraying service in Niagara county in 1917. New York Dept. Farms and Markets, Agric. Bull. 106: 1-147. Fig. 1-37. 1918.—An account of an effort by the Farm Bureau of Niagara County, New York, cooperating with other State and Federal agencies, to furnish a large number of fruit growers with accurate, timely information on spraying for the control of fungous diseases and insect pests. Some of the methods employed were original and unique. By means of a telephone relay system and code messages the information was disseminated with remarkable rapidity. Instructions were given for the control of scab and codlin moth in apple orchards; psylla in pear orchards; yellow

leaf, curculio and red mite in plum orchards; yellow leaf and fruit fly in cherry orchards; curculio and fruit spot in quince orchards; and downy mildew in vineyards. In making his recommendations for treatment the expert in charge was guided by the conditions in representative ("criterion") orchards kept under close observation in different parts of the county. These recommendations are given in detail together with a large number of data on the results obtained by orchardists who carried them out. The authors consider the undertaking to have been highly successful.—F. C. Stewart

114. TOBLER, G. **Sulfadherent**. Zeitschr. Pflanzenkr. 28: 210. 1918.—This is the name of a preventive which H. Callier, of Lausanne, has found valuable for [the mildews? of] grapes. It consists essentially of a mixture of sulfur, copper sulfate and nicotine. It adheres better than other mixtures. Two applications are enough [to control the mildews?], the first treatment being made about June 1, the second late in July. The material is applied dry. It seems also to have value for control of "potato diseases."—D. Reddick.

115. WECK, [—] "Uspulun," ein neues Beizmittel für Getreide. ["Uspulun," a new disinfectant for grains.] Illustr. landw. Zeitg. 36: 552. 1918.—Effective agent is a mercury salt of a chlorophenol. In its effect on germination of the seed and on control of smut it has proved efficient in comparison with other disinfectants. [Through abstr. by O. VON KIRCHNER in Zeitschr. Pflanzenkr. 28: 50. 1918.]—W. H. Rankin.

116. WEIMS, J. E. Einfluss der Witterungsverhältnisse auf das Auftreten von Pflanzenkrankheiten und tierischen Schädlingen 1916 und 1917. I. [Influence of weather conditions on the occurrence of plant diseases and animal pests in 1916 and 1917. I.] Zeitschr. Pflanzenkr. 28: 116-142. 1918. Same general title, II, III, IV. Ibid. 28: 201-210. 1918.—In gathering material for "Herbarium pathologicum" (Weigel: Leipzig) during wet season, 1916 and dry season, 1917, observations were made on prevalence of a large number of diseases which are noted, each in a short paragraph. General conclusion is that wet weather favors and dry weather suppresses the appearance of diseases caused by following organisms: *Phytophthora infestans*, *Plasmopara viticola*, *Peronospora viciae*, *P. nivea*, *P. schleideni*, *Bremia lactucae*, *Cystopus candidus*, *O. tragopogonis*, *Ustilago* spp., *Uromyces betae*, *Puccinia pisi*, *P. graminia*, *P. coronifera*, *Phragmidium subcorticium*, *Ph. violaceum*, *Cronartium paronae*, *Melampsora salicina*, *Sphaerotheca pannosa*, *Erysiphe polygoni*, *Phyllactinia corylea*, *Uncinula necator*, *Microsphaera alni*, *Entomosporium maculatum*, *Marssonina juglandis*, *Clasterosporium carpophilum*, *Fusicladium dendriticum*, *F. pirinum*, *Gloeosporium ribis*, *G. lindemuthianum*, *G. nervisequum*, *Actinonema rosae*, *Phyllosticta fragarticola*, *Ph. rosae*, *Aecchylo pisi*, *Septoria piriicola*, *S. apii*, *Epichloë typhina*, *Claviceps purpurea*, *Rhizisma acerum*, *Ceratophorum setosum*.—While infection usually occurs in young leaves the cuticle of which is not fully developed, in some cases infection comes only after full development. Here are found the following parasites: *Entomosporium maculatum*, *Cronartium ribicola*, *Ceratophorum setosum*.—The following are dependant on wet soil: *Plasmodiophora brassicae*, *Tilletia trifolii*, and the true loose smuts.—There is a considerable group of parasites unclassified.—II. Origin of certain leaf spots on various ornamental plants is discussed. These appear in rainy seasons and are caused by shading and the action of various saprophytes which attack primarily the clinging petals of fallen blossoms.—III. Effect of seasons on a long list of insect pests.—IV. Control of mustard by dusting with calcinated iron sulfate or with 40 per cent mixture of potassium chloride or nitrate in lime dust on moist foliage. Iron-sulfate spray (15-20 per cent) is also effective.—D. Reddick.

PHARMACEUTICAL BOTANY AND PHARMACOGNOSY

HENRY KRAEMER, *Editor*

117. HOLM, T. *Juglans nigra* L. and *J. cinerea* L. *Merek's Rept.* 27: 115-117, 168-170. 1918.—*Juglans nigra*, a large tree of the Juglandaceae is of some importance medicinally and as a dyestuff, the rind of the green fruit and the bark of the root being used. The staminate and pistillate flowers and the internal structure of the vegetative organs are figured and described in detail. The bark of the root of *J. cinerea* is used similarly, and the structure is said to be identical with that of *J. nigra*.—*J. Moser.*

118. HOLMES, E. M. Ghassoul—A Morocco Drug. *Pharm. Jour.* 101: 317. 1918.—A packet of stalks and buds included in a collection of Morocco drugs brought to England by Dr. Arthur Leared in 1873 and used in Morocco for cleaning woolen clothes, was approximately identified at that time as derived from the genus *Mesembryanthemum*.—M. E. Wilczek Schiw. *Apoth. Zeit.* Oct. 3, 1918) states that a sample of Ghassoul, which is used as a substitute for soap in Abyssinia, contained some ripe seeds which upon planting developed into fine specimens of *Mesembryanthemum nodiflorum* and *M. crystallinum*, the latter in smaller proportion.—This apparently completes the identification of Dr. Leared's sample. The ash of species of this genus yields a very pure soda but the detergent qualities of the plant probably are due to saponin.—*E. N. Gathercoal.*

119. GREENISH, HENRY G. Examination of a Transvaal Croton bark. *Pharm. Jour.* 101: 29. 1918.—This bark obtained from South Africa where it is pronounced as an excellent remedy, in 2-grain doses, for bilious malarial fever, was referred at the Royal Botanic Gardens, Kew, to the tree, *Croton Gubouga* S. Moore, a species widely spread in Nyasaland, Rhodesia and Portuguese East Africa.—In external appearance the bark is 2 to 3 mm. thick, generally gray in color, with corky warts or longitudinal bands of cork. The bark possesses a persistently acrid, somewhat numbing taste. Microscopically, bast fibers, single and in groups, much thickened and distinctly striate were found; sclerenchyma cells, about the size of the parenchyma and formed into small masses were abundant; calcium oxalate crystals in prisms and rosettes were very numerous; a few small starch grains and small oil drops were found in the parenchyma cells and in the longitudinal section some elongated cells with the inner lamellae of the walls suberized and containing yellowish granular secretion were seen.—Upon exhaustion with petroleum spirit, 2.54 per cent of thick fatty oil, exceedingly acrid in taste, was obtained. Further exhaustion with ether and chloroform yielded very small, slightly acrid residues, but alcohol then removed 2.71 per cent of extractive, acrid in taste. Alcohol of 50 per cent strength apparently extracts the drug. No volatile principles were obtained, nor alkaloids nor bitter principles. The viscid oil was in too small quantity for further examination.—This bark therefore corresponds, in many respects, to some other Croton barks, especially to that of *Croton Tiglium* which, is extremely acrid.—*E. N. Gathercoal.*

PHYSIOLOGY

B. M. DUGGAR, *Editor*

GENERAL

120. HARVEY, R. B. Hardening process in plants and developments from frost injury. *Jour. Agric. Res.* 15: 83-112. Pl. 7-11, A; Fig. 1-3. 1918.—The author makes an extensive study of frost injury to various plants and concludes that it varies largely with the plant. Succulent plants exhibit the appearance of injected areas over the leaf surface; leaves of cabbage and the like show stimulated growth with ultimate production of tumors; and leaves of tomato and *Coleus* are killed. Various suggestions are offered in explanation of the effects of frost injury, the increase of hydrogen-ion concentration being considered the

principal factor. Less injury is noted with plants that have been hardened, and the phenomenon is explained upon the grounds that the process of hardening so alters the constituents of the protoplasm that the precipitation of proteins is averted. [See Bot. Absts. 2, Entry 374.]—R. W. Webb.

121. STANFORD, ERNEST E., AND ARNO VIERHOEVER. Chemistry and histology of the glands of the cotton plant, with notes on the occurrence of similar glands in related plants. Jour. Agric. Res. 13: 419-435. Pl. 42-60. 1918.—See Bot. Absts. 1, Entry 1587.

122. TRUE, RODNEY H., OTIS F. BLACK, JAMES W. KELLY, H. H. BUNNELL, LON A. HAWKINS, SAMUEL L. JODIDI, AND EDWARD H. KELLOGG. Physiological studies of normal and blighted spinach. Jour. Agric. Res. 15: 369-405. 1918.—A biochemical study of a "mosaic" disease is elaborated, dealing with ash, carbohydrate, nitrogen, and oxidase contents, and activities in normal and in blighted spinach.—R. W. Webb.

DIFFUSION AND PERMEABILITY

123. OSTERHOUT, W. J. V. Conductivity as a measure of permeability. Jour. Biol. Chem. 36: 485-487. 1918.

124. OSTERHOUT, W. J. V. A method of measuring the electrical conductivity of living tissues. Jour. Biol. Chem. 36: 557-568. Fig. 1-8. 1918.

125. OSTERHOUT, W. J. V. Note on the effect of diffusion upon the conductivity of living tissue. Jour. Biol. Chem. 36: 489-490. 1918.

WATER RELATIONS

126. BAKKE, ARTHUR L. Determination of wilting. Bot. Gaz. 66: 81-116. Fig. 1-5. 1918.—Daily march of transpiration of *Helianthus annuus* is studied by the standardized by-gonometric paper method. [See Bot. Absts. 1, Entry 820.]—R. W. Webb.

127. KIDD, F., AND C. WEST. Physiological pre-determination: the influence of the physiological condition of the seed upon the course of subsequent growth and upon the yield. I. The effects of soaking seeds in water. Ann. Appl. Biol. 5: 1-10. Pl. 1-8. 1918.—The experiments described lead to the conclusions that soaking seed in distilled water previous to sowing may have a marked effect upon the subsequent growth of the plant, that a germination test cannot be relied upon in the least to give any criterion of what this effect may be, and that the nature of the effect is strongly specific, quite different results being obtained by similar treatment of closely allied plants.—S. M. Zeller.

128. MILLER, EDWIN C., AND W. B. COFFMAN. Comparative transpiration of corn and the sorghums. Jour. Agric. Res. 13: 579-604. Pl. 62-65, Fig. 1-15. 1918.—When varieties of corn and sorghum were grown in large galvanized iron cans, it was found that any variety of corn always transpired more per plant than any sorghum, but the transpiration per unit area was greater in the case of the sorghum than in that of the corn, the difference being due to the extent of the leaf surfaces. Differences of transpiration were more marked after full leaf development and under severe climatic conditions.—R. A. McGinty.

MINERAL NUTRIENTS

129. FENN, W. O. The effects of electrolytes on gelatin and their biological significance. II. The effect of salts on the precipitation of acid and alkaline gelatin by alcohol. Antagonism. Jour. Biol. Chem. 33: 439-451. Fig. 1-6. 1918.

130. FENN, W. O. The effects of electrolytes on gelatin and their biological significance. III. The effects of mixtures of salts on the precipitation of gelatin by alcohol. Antagonism. Jour. Biol. Chem. 34: 141-160. Fig. 1-9. 1918.

131. FENN, W. O. The effects of electrolytes on gelatin and their biological significance. IV. The precipitation of gelatin by mixtures of salts. *Jour. Biol. Chem.* 34: 415-428. Fig. 1-4. 1918.
132. LOEB, JACQUES. The influence of neutral salts, bases, and acids on the precipitability of gelatin by alcohol. *Jour. Biol. Chem.* 34: 489-501. 1918.
133. LOEB, JACQUES. Ionization of proteins and antagonistic salt action. *Jour. Biol. Chem.* 33: 531-549. 1918.
134. LOEB, JACQUES. The origin of the conception of physiologically balanced salt solutions. *Jour. Biol. Chem.* 34: 503-504. 1918.
135. MILLAR, C. E. Relation between biological activities in the presence of various salts and the concentration of the soil solution in different classes of soil. *Jour. Agric. Res.* 13: 217-223. 1918.—From data obtained by the use of different soils containing varying amounts of salts and dried blood, the author concludes that it is improbable that in the ammonification of the dried blood, osmotic pressure is the governing factor. The nature of the soil used apparently modifies the effect of the various salts on ammonification to a considerable extent.—R. A. McGinty.
136. TOTTINGHAM, W. E. The sulfur requirement of the red clover plant. *Jour. Biol. Chem.* 36: 429-438. Fig. 1-2. 1918.

METABOLISM (GENERAL)

137. BENTHELOT, ALBERT. Recherches sur la flore intestinale contribution à l'étude des microbes producteurs de phénol principaux caracteres du *Bacillus phenologenes*. [A study of intestinal microbes producing phenol, especially *Bacillus phenologenes*.] *Ann. Inst. Pasteur* 32: 17-36. Fig. 1-2. 1918.—After referring briefly to the production of phenol by the organisms of the intestinal tract the author describes in detail the characteristics of the species mentioned above on a variety of culture media. On a culture medium containing tyrosin he was unable to determine the presence of any *P-cresol* but invariably, even in media slightly aerated, a definite test for phenol. Furthermore, the cultures showed a reddish tint analogous to that of phenol exposed to the air, and this appeared in all except the anaerobic cultures. Many data are given showing the influence of the culture medium upon the production of phenol.—B. M. Duggar.
138. BLISH, M. J. A study of the non-protein nitrogen of wheat flour. *Jour. Biol. Chem.* 33: 551-559. 1918.
139. CHICK, HARRIETTE, AND E. MARGARET HUME. The effect of exposure to temperatures at or above 100°C. upon the substance (vitamine) whose deficiency in a diet causes polyneuritis in birds and beri-beri in man. *Proc. Roy. Soc. London B*, 90: 60-68. 1918.—An exposure of wheat embryo to a temperature of 100°C. for two hours produced no significant loss in anti-neuritic "vitamine," but at a temperature of 120° there was swift destruction of the anti-neuritic properties.—B. M. Duggar.
140. CHICK, HARRIETTE, AND E. MARGARET HUME. The distribution in wheat, rice, and maize grains of the substance, the deficiency of which in a diet causes polyneuritis in birds and beri-beri in man. *Proc. Roy. Soc. London B*, 90: 44-60. 1918.
141. DUTCHER, R. ADAMS. Vitamine studies. III. Observations on the curative properties of honey, nectar, and corn pollen in avian polyneuritis. *Jour. Biol. Chem.* 36: 551-555. 1918.
142. DUTCHER, R. ADAMS, AND FERDINAND A. COLLATZ. Vitamine studies II. Does water-soluble vitamine function as a catalase activator? *Jour. Biol. Chem.* 36: 547-550. 1918.

143. EVEREST, ARTHUR ERNEST. The production of anthocyanine and anthocyanidin. Part III. Proc. Roy. Soc. London B, 90: 251-265. 1918.—Continuing investigations begun several years earlier it is pointed out that evidence is required to determine whether anthocyan pigments produced in plants originate via flavonols or by direct synthesis, independent of the former. An elucidation of this point is the direction towards which the investigations have naturally turned in the present paper. A study of the *Viola* pigments has been begun with some results bearing upon the problem indicated. The work seems to indicate that in the variety "Black Knight" there occurs a glucoside of myricetin side by side with a glucoside of delphinidin, thus in the same flower an anthocyan pigment and a flavonol derivative from which it would be produced by reduction. The reactions of anthocyan pigments are considered in some detail. The author's anthocyanidin is shown to be identical with delphinidin. In further work it is proposed to determine whether or not the two classes of pigments, anthocyan, and flavone derivatives, occur attached to the same sugars.—*B. M. Duggar.*
144. GREG, E. D. W., AND DAGMAR F. CHERJEL. Report on the anti-beri-beri vitamin content of three kinds of atta biscuits. Indian Jour. Med. Res. 6: 56-67. 1918.—Fifteen per cent atta biscuit contains considerable amount of anti-beri-beri vitamin.—*R. W. Webb.*
145. HOGAN, ALBERT G. The nutritive properties of kafirin. Jour. Biol. Chem. 33: 151-159. Charts 1-4. 1918.
146. JOHNS, CARL O., AND LEWIS H. CHERNOFF. The globulin of buckwheat, *Fagopyrum fagopyrum*. Jour. Biol. Chem. 34: 439-445. 1918.
147. JOHNS, CARL O., A. J. FINKS, AND C. E. F. GERSDORF. Globulin of the coconut, *Cocos nucifera*. 1. Preparation of coconut globulin. Distribution of the basic nitrogen in coconut globulin. Jour. Biol. Chem. 37: 149-153. 1919.—The globulin prepared contains all the basic amino acids necessary for maintenance and growth. The free amino acid is about equal to one-half the lysine nitrogen as determined in the Van Slyke analysis.—*B. M. Duggar.*
148. JOHNS, CARL O., AND A. J. FINKS. Stizolobin of the Chinese velvet bean, *Stizolobium niveum*. Jour. Biol. Chem. 34: 429-438. 1918.
149. JOHNS, CARL O., AND D. BREESE JONES. The determination of tyrosine in proteins. Jour. Biol. Chem. 36: 319-322. 1918.
150. JONES, D. BREESE, AND CARL O. JOHNS. The hydrolysis of kafirin. Jour. Biol. Chem. 36: 323-334. 1918.
151. KURIYAMA, SHIGENOBU. The physiological behavior of raffinose. II. Jour. Biol. Chem. 34: 321-333. 1918.
152. LEVENE, P. A. The structure of yeast nucleic acid. III. Ammonia hydrolysis. Jour. Biol. Chem. 33: 425-428. Fig. 1. 1918.
153. LEVENE, P. A. The structure of yeast nucleic acid. II. Uridine-phosphoric acid. Jour. Biol. Chem. 33: 229-234. Fig. 1-2. 1918.
154. LEVENE, P. A., AND C. J. WEST. Lecithin. II. Preparation of pure lecithin; composition and stability of lecithin cadmium chloride. Jour. Biol. Chem. 34: 175-186. 1918.
155. MCCOLLUM, E. V., N. SIMONDS, AND H. T. PARSONS. Supplementary relationships between the proteins of certain seeds. Jour. Biol. Chem. 37: 155-178. Charts 1-77. 1919.—Numerous data are given showing the degree to which the proteins from different seeds supplement each other, all experiments being conducted with rats.—*B. M. Duggar.*

156. McCOLLUM, E. V., N. SIMMONDS, AND H. T. PARSONS. The dietary properties of the potato. *Jour. Biol. Chem.* 36: 197-210. *Charts 1-7.* 1918.

157. OSBORNE, THOMAS B., AND LAFAYETTE B. MENDEL. The vitamins in green foods. *Jour. Biol. Chem.* 37: 187-200. *Charts 1-3.* 1919.—It is concluded that green vegetables are an important addition to the diet of man because such staples as meat, cereals, potatoes, sugar, and fats probably yield an insufficient quantity of either of the vitamins to meet the dietary requirements.—*B. M. Duggar.*

158. SUMNER, JAMES B. The globulins of the Jack bean, *Canavalia ensiformis*. *Jour. Biol. Chem.* 37: 137-141. *Pl. 1.* 1919.—A preliminary paper in which the author reports the isolation to two new crystalline globulins, named concanavalin A and concanavalin B, and of one new non-crystalline globulin—canavalin—from the Jack bean.—*B. M. Duggar.*

159. WALLIS, R. L. MACKENZIE. Report upon the food value of the ground-nut. *Indian Jour. Med. Res.* 6: 46-55. 1918.

160. OSBORNE, THOMAS B., AND LAFAYETTE B. MENDEL. Nutritive factors in plant tissues. I. The protein factor in the seeds of cereals. *Jour. Biol. Chem.* 34: 521-535. *Chart 1.* 1918.

161. PAGNI, AUGUST J. P., AND DOROTHY WRIGHT RUSSELL. The presence of a growth-producing substance in cultures of typhoid bacilli. *Jour. Biol. Chem.* 34: 43-49. *Fig. 1-4.* 1918.

162. SAMPSON, HOMER C. Chemical changes accompanying abscission in *Coleus Blumei*. *Bot. Gaz.* 66: 32-53. 1918.—Using microchemical methods, the author finds that abscission of leaves in *Coleus Blumei* results from an excess amount of pectic acid which is formed by the conversion of cellulose into pectose and the further transformation of the pectose into pectin and pectic acid.—*R. A. McGinty.*

163. SHERMAN, H. C., AND JET C. WINTERS. Efficiency of maize protein in adult human nutrition. *Jour. Biol. Chem.* 35: 301-311. 1918.

164. STEENBOCK, H., P. W. BOUTWELL, AND HAZEL E. KENT. Fat-soluble vitamins. I. *Jour. Biol. Chem.* 35: 517-526. *Charts 1-16.* 1918.

165. STEENBOCK, H., HAZEL E. KENT, AND E. G. GROSS. The dietary qualities of barley. *Jour. Biol. Chem.* 35: 61-74. *Charts 1-20.* 1918.

166. SUGIURA, KANEMATSU, AND STANLEY R. BENEDICT. The nutritive value of the banana. *Jour. Biol. Chem.* 36: 171-189. *Charts 1-16.* 1918.

METABOLISM (NITROGEN)

167. BRADLEY, HAROLD C., AND M. STARR NICHOLS. Nitrogen content of bacterial cells. I. Method. *Jour. Biol. Chem.* 33: 525-529. 1918.

168. DAVIDSON, J. Do seedlings reduce nitrate? *Jour. Biol. Chem.* 37: 143-148. 1919.—Experiments on a considerable scale were arranged with seedlings of wheat, corn, barley, oats, rye, and rice, for the most part floated on solutions of sodium nitrate of a concentration of 1000 parts per million. Colorimetric tests for nitrite were made about twenty-four hours apart for several days. In general it is shown that nitrates are not reduced by seedlings in the outside medium as a result of their metabolic processes. Nitrate reduction, fluctuating in amount from day to day, does occur when the surfaces of the seeds come in contact with the salt solution, and the data indicate that such reduction is a result of bacterial activity.—*B. M. Duggar.*

169. FRED, E. B., AND AUDREY DAVENPORT. Influence of reaction on nitrogen-assimilating bacteria. *Jour. Agric. Res.* 14: 317-336. *Fig. 1.* 1918.—Behavior of legume bacteria and *Azotobacter* toward small amounts of acid or alkali depends on the nature of the medium and the dissociation of the acid and alkali; the sensitiveness of various organisms to such reactions is determined.—*R. W. Webb.*

METABOLISM (ENZYME ACTION)

170. ABDERHALDEN, E., AND H. SCHATMANN. Studien über die Beeinflussbarkeit der Wirkung einiger Fermente der Hefe durch Stoffe, die sich mit Alkohol aus der Hefezelle abtrennen lassen. [The influence of alcohol-soluble substances from the yeast cell on the activity of certain yeast enzymes.] *Fermentforschung* 2: 120-150. *Pl. 1-2.* 1918.

171. ABDERHALDEN, E., AND A. FODOR. Forschungen über Fermentwirkung. III. Mitteilung: Weitere Studien über die Adsorption von Aminosäuren und Polypeptiden und ferner von verschiedenen Kohlehydraten durch Tierkohle. [Enzyme action. Further studies on adsorption of amino acids, polypeptides and carbohydrates by animal charcoal.] *Fermentforschung* 2: 151-166. *Fig. 1-4.* 1918.

172. ABDERHALDEN, E., AND A. FODOR. Forschungen über Fermentwirkung. IV. Mitteilung: Weitere Studien über die Adsorption der Gemische von Aminosäuren mit Polypeptiden und anderen Substanzen. Das Verhalten von Aminosäuren und Polypeptiden gegenüber Eiweißlösungen, Blutserum und bei der Koagulation von Solen.⁸ V. Mitteilung: Ultrafiltrationsversuche mit Mischungen bestehend aus Aminosäuren bzw. Polypeptiden und Hefemazerationsflüßen. Stützen für den kolloiden Zustand der Fermente und Erweiterung der Adsorptionstheorie. [Enzyme action. IV. Adsorption of mixtures of amino acids and polypeptides and the relation of these to albumin solutions and blood serum and to the coagulation of soles. V. Ultrafiltration with mixtures of amino acids, polypeptides and macerated yeast juice. The colloidal condition of enzymes.] *Fermentforschung* 2: 211-250. *1 fig.* 1918.

173. CROCKER, WILLIAM, AND GEORGE T. HARRINGTON. Catalase and oxidase content of seeds in relation to their dormancy, age, vitality, and respiration. *Jour. Agric. Res.* 15: 137-174. *Fig. 1-3.* 1918.—Experimental methods and work are cited, and an extensive study is made of catalase and oxidase of many seeds under various conditions.—*R. W. Webb.*

174. EULER, H., O. SVANBERG, AND S. HEINTZE. Quantitative Bestimmungen der enzymatischen Tätigkeit in lebenden Zellen. I. [Quantitative determinations of enzyme activity in living cells.] *Fermentforschung* 2: 194-199. 1918.

175. FALK, I. S. The influence of certain salts on enzyme action. *Jour. Biol. Chem.* 36: 220-247. 1918.

176. JEWELL, MINNA D., AND HOWARD B. LEWIS. The occurrence of lichenase in the digestive tract of invertebrates. *Jour. Biol. Chem.* 33: 161-167. 1918.

177. SHERMAN, H. C., A. W. THOMAS, AND M. E. BALDWIN. Influence of hydrogen ion concentration upon enzyme activity of three typical amylases. *Proc. Soc. Exp. Biol. Med.* 16: 17-18. 1918.—Pancreatic and malt amylase and the amylase of *Aspergillus oryzae* (prepared from taka-diastase) have been selected as representative of the starch-splitting enzymes of the higher animals, higher plants, and fungi respectively. Laboratory methods for the purification of each of these amylases have been described in previous papers. The present experiments were performed with enzyme preparations which had been purified in accordance with these methods. The experiments establish for each of the three amylases the limits of hydrogen ion concentration within which any enzymic activity is shown, and the form of the curve representing the activities at all concentrations of hydrogen ion between these limits. The investigation was carried out with the aid of a grant from the Carnegie Institution of Washington.—*H. C. Sherman.*

178. SVANBERG, OLOF. Enzymatische Untersuchungen einer *Torula*-Hefe. [Enzymatic studies of a *Torula*.] *Fermentforschung* 2: 201-211. Fig. 1. 1918.—The author details experiments with a *Torula*, not previously investigated, in respect to determinations of the velocity of fermentation, the increase in cell number, and the inversion capacity per cell and per gram dry weight. It is shown that ferment capacity is much like that of known culture yeasts. No organic phosphate compounds could be identified.—B. M. Duggar.

179. WOLFF, J., AND B. GERLIN. Étude des produits de dégradation diastasique de l'inuline dans la racine de chicorée. [Decomposition products of inuline in chicory roots by enzyme action.] *Ann. Inst. Pasteur* 32: 71-96. 1918.—It is shown that aside from inulin there may be found in the plant investigated certain products of less molecular weight which are designated inulids. These bodies are non-reducing and they are attacked by certain yeasts, whereas inulin is not. The roots harvested one month also exhibit a carbohydrase (inulase) slightly active and easily decomposable, likewise a very small amount of reducing sugar. From a study of roots which had been stored two months the author concludes that there is strong presumptive evidence indicating the existence in the root as well as in certain yeasts of the same enzyme acting upon inulids and not upon inulin. The inulin ferment invariably acts slowly both within the plant and through *in vitro* experiments. The inulids studied are tentatively grouped in three classes according to the quantities of alcohol yielded upon fermentation.—B. M. Duggar.

REGENERATION

180. BRIERLEY, W. B. On cell-regeneration in *Botrytis cinerea*. *Ann. Bot.* 32: 601-604. Fig. 1-3. 1918.—Types of injury which stimulate a healing reaction are grouped as (1) acute flexion of cells; (2) punctures or minute wounds; (3) relatively large lesions. Two distinct regenerative processes are involved, i.e., (1) restitution of the original cell wall, and (2) formation of a completely new membrane about the escaped protoplasm. Since the protoplasm still lives when a part is thus in a free plasmodial state the Swedish conception of mycoplasma should not be ignored. The author refers to an unpublished work in which he describes naked hyphae of *Botrytis cinerea* existing as free protoplasmic substance in the tissues of *Aecidius Paria*.—S. M. Zeller.

181. LOEB, JACQUES. Healthy and sick specimens of *Bryophyllum calycinum*. *Bot. Gaz.* 66: 69. 1918.—Replying to a criticism of his views in regard to the production of shoots by the leaves of abnormal plants of *B. calycinum*, the author points out that the photograph of the plant referred to by Miss E. L. Braun in her paper (*Bot. Gaz.* 65: 191. 1918), shows it to have been an abnormal and not a normal plant, as assumed, and that it was therefore not exceptional in producing shoots from the leaves while the latter were still attached to the parent.—R. A. McGinty.

182. LOEB, JACQUES. The chemical mechanism of regeneration. *Ann. Inst. Pasteur* 32: 1-16. Fig. 1-3. 1918.—The material in this paper has been previously abstracted. [*Bot. Abstr.* 1, Entries 68, 736].

TEMPERATURE RELATIONS

183. HARTLEY, CARL. Stem lesions caused by excessive heat. *Jour. Agric. Res.* 14: 365-604. Fig. 1. 1918.

184. VINALL, H. N., AND H. R. REED. Effect of temperature and other meteorological factors on the growth of sorghums. *Jour. Agric. Res.* 13: 133-147. Pl. 11-12. 1918.—From observations upon sorghums growing in localities with widely varying meteorological conditions, the author concludes that due to its semitropical adaptations, sorghum will not thrive in regions of low temperatures and that a high percentage of sunshine is probably an important factor in growth. The effect of weather conditions upon germination, flowering and fruiting, yield of seed, and number of leaves per plant is considered.—R. A. McGinty.

LIGHT RELATIONS

185. LAROQUETTE, MIRAMOND DE. *Expériences sur l'action bactéricide de la lumière solaire (lumière blanche totale et lumières partielles ou de couleurs).* [The bactericidal action of sunlight and of light of various colors.] *Ann. Pasteur* 32: 170-192. Fig. 1-3. 1918.—The author was impressed by the necessity of investigating more completely the action of light of various wave lengths aside from ultraviolet, to which so much attention has already been given. For a considerable number of the experiments use was made of houses constructed with glass of different colors, installed at Algiers, for an extended investigation of the effects of blue, green yellow, and red lights upon various organisms. A spectrographic examination of the glass was made and the chemical values determined. Extensive experiments were made with cultures of six species of microorganisms on various media. In general, it is stated that sunlight is only bactericidal when intense, or when long continued, acting especially at the surfaces of dry media and in the air, whereas in liquid media there is much slower action. White light is much more injurious than "partial" light of any color. Diffuse light is insufficient. Of the colored lights indicated blue is slowly bactericidal but much less than white. After the blue follow respectively yellow, red, and green. It is concluded that the visible part of the solar spectrum is the most active, the elimination of ultraviolet scarcely sensibly diminishing the injurious action. The bactericidal power lies both in the chemical and in the dehydrating action. In a practical way, in hygiene and therapeutics, little stress may be laid upon the bactericidal action of sunlight, owing to its small penetrating power. Similarly, in heliotherapy it is only cutaneous affections which may be successfully treated.—*B. M. Duggar.*

186. SCHANZ, FRITZ. *Wirkungen des Lichts auf die Pflanze.* [The effects of light on plants.] *Biol. Zentralbl.* 38: 283-296. Fig. 1-6. 1918.—After a discussion of the effect of ultraviolet light upon certain proteins the author proceeds to consider the influence of light of various wave lengths upon the activities of the cell and of the plant in general. Special attention is drawn to the character of the daylight to which plants are exposed at different periods of the year, and to such light modified by the prevalent atmospheric conditions. A few simple experiments were made, and the results of these, together with observations at various altitudes, led to the conclusion that in general the low and sturdy vegetation form of the high mountains is promoted by the shorter wave lengths. As this stimulus declines toward the plains, so the increased length of the plant becomes more marked.—*B. M. Duggar.*

187. SIERP, HERMANN. *Über die Lichtquellen bei pflanzenphysiologischen Versuchen.* [Sources of light for plant physiological experiments.] *Biol. Zentralbl.* 38: 221-257. Fig. 1-10. 1918.—The author presents an extensive review of the early literature relating to artificial sources of light. The difficulties of the subject are set forth and the directions in which the most practical development is to be anticipated.—*B. M. Duggar.*

TOXIC AGENTS

188. ALLARD, H. A. *Effects of various salts, acids, germicides, etc., upon the infectivity of the virus causing the mosaic disease of tobacco.* *Jour. Agric. Res.* 13: 619-637. 1918.—The author gives the results of extensive experiments along the line indicated. Formaldehyde and strong alcohol were found to destroy the infective principle quickly, alcohol of 30-50 per cent was destructive only after an interval of some days, while many other substances affected the "virus" to a less degree or not at all. [See Bot. Absts. 1, Entry 1004.]—*R. A. McGinty.*

MISCELLANEOUS

189. BOCK, JOSEPH C., and STANDLEY R. BENEDICT. *A new form of colorimeter.* *Jour. Biol. Chem.* 35: 227-230. Fig. 1-3. 1918.

190. CULLEN, GLENN E., and J. HAROLD AUSTIN. *Hydrogen ion concentrations of various indicator end-points in dilute sodium hypochlorite solutions.* *Jour. Biol. Chem.* 34: 553-568. Fig. 1. 1918.

191. HARRIS, J. ARTHUR. Secondary parasitism in *Phoradendron*. Bot. Gaz. 66: 275-276. 1918.—By the use of data (which are, however, stated to be insufficient) the author points out that the parasitism of *Phoradendron californicum* on *P. flarescens*, recently cited by Brown is just the reverse of what might be expected if successful parasitism were based upon higher osmotic concentration in the tissue fluids of the parasite.—R. A. McGinty.

192. HOLMES, M. G. A study in the anatomy of hazel-wood with reference to conductivity of water. Ann. Bot. 32: 553-567. Fig. 1-10. 1918.—A statistical method of investigating the constitution of wood is described from the standpoint of its efficiency for conducting water. The number, size, and distribution of the elements in the hazelwood are recorded in a graphical form. This method is intended to serve as a basis for correlating with anatomy the facts of specific conductivity obtained by experiment. In stool shoots of the hazel the figures have shown a very considerable variation in the constitution of the wood formed during the first season. On the whole there is a general decline in total conductivity and a general rise in specific conductivity from the base of the shoot to its distal end, for the wood fibers towards the base are supplied with a greater proportion of mechanical elements for support rather than water conduction. [See Bot. Absts. 1, Entry 1592.] S. M. Zeller.

193. MAGROU, J. L'immunité dans la symbiose. [Immunity and symbiosis.] Ann. Inst. Pasteur 32: 37-47. Pl. I. 1918.—The author discusses the endophytic parasitism in orchids, the occurrence in wild species of *Solanum* of a parasitism of similar habits, and the conditions under which *Solanum tuberosum* may be inoculated with the fungus characteristic of wild forms. In reality cultivated species of *Solanum* have acquired a resistance to the penetration of various fungi by a tissue modification which is primarily mechanical, but this does not eliminate the specific endophyte of this host. The potato, is unable however, to tolerate long the existence of the parasitic endophyte and after penetration immunity is exhibited by the rapid degeneration of the parasite. The author considers this destruction of the parasite to be a phagocytic process. In all cases the infestation is strictly limited to superficial tissues of the young roots in regions completely differentiated and above the level of the zone of root hairs. The infestation does not extend to the tubers and to aerial parts. The author believes it possible to draw a close analogy between immunity in plants and in animals.—B. M. Duggar.

194. WILLIAMS, MAUD. Absorption of gold from colloidal solutions by fungi. Ann. Bot. 32: 531-534. 1918.—Conidia of *Penicillium glaucum* and *Oidium lactis* germinate and the mycelium develops in solutions of colloidal gold which contain tannin or gum arabic. During growth the fungi remove the metal from the solution. Retention of the gold occurs in walls which are not cuticularized. When masses of dead fungous mycelium are introduced into the solutions the process of absorption goes on more irregularly. The more diffusible solutions color the fungus more quickly than those with a lower rate of diffusion. The accumulation of gold produces a blue coloration. The process is not explained. S. M. Zeller.

TAXONOMY OF NON-VASCULAR CRYPTOGRAMS

J. R. SCHRAMM, Editor

BRYOPHYTES

195. ANDREWS, A. LEROY. Bryological notes, IV. A new hybrid in *Physcomitrium*. Foreya 18: 52-54. 1918.—A number of species of annual Funariaceae were collected upon the silt of a reclaimed marsh at Ithaca, New York. Among them were specimens obviously hybrids between *Physcomitrella patens*, ♀, and *Physcomitrium turbinatum*, ♂. A description of the sporophyte, the only hybrid portion, is given, and a few notes upon moss hybrids in general. In footnotes a record is made of the first collection of *Physcomitrium Hookeri* east of Ohio, and of certain distinguishing features of the species *Physcomitrella patens* and *Lophorrhagnum seriatum*.—E. B. Chamberlain.

LICHENS

196. MOXLEY, GEORGE L. Additions to the lichen flora of Southern California. Bull. Southern California Acad. Sci. 17: 61-62. 1918.—Announcement as previously unreported from Southern California of three lichens, viz., *Parmelia dubia*, *Physcia obscura* var. *viridis*, and *Physcia caesia*.—W. A. Setchell.

ALGAE

197. GARDNER, NATHANIEL LYON. New Pacific coast marine algae II. Univ. California Pub. Bot. 6: 429-454. Pl. 36-37. 1918.—The following new species of Setchell and Gardner are described and illustrated: *Chlorogloea lutea*, *Xenococcus Chaetomorphae*, *Dermocarpa hemisphaerica*, *D. pacifica*, *D. suffulta*, *D. sphaeroides*, *Hyella Littorinae*, *H. linearis*, *H. socialis*, *Radaisia Laminariae*, *R. clavata*, *R. subimmersa*, and *R. epiphytica*. The new combination *Chlorogloea conferta* (Kuetz.) Setchell and Gardner is proposed, and a note as to the identity of *Sargassum dissectifolium* Setchell and Gardner with the previously published *S. Palmeri* Grunow is added.—W. A. Setchell.

198. GARDNER, NATHANIEL LYON. New Pacific coast marine algae III. Univ. California Pub. Bot. 6: 455-480. Pl. 38-41. 1918.—The following new species, or new combinations, of Setchell and Gardner are described and illustrated: *Anacyrtia elabens* (Kuetz.), *Dermocarpa protea*, *D. sphaerica*, *Xenococcus acervatus*, *X. Cladophorae*, *X. Gilkeyae*, *X. pyriformis*, *Pleurocapsa entophyaloides*, *P. gloeocapsoides*, *Arthrospira breviaritculata*, *Phormidium hormoides*, *Lyngbya Willii*, *Symploca funicularis*, *S. aeruginosa*, *Microcoleus Weekii*, *M. confuens*, *Calothrix rectangularis*, *C. robusta*, *Dichothrix seriata*, *D. minima*, *Rivularia mamillata*, and *Brachytrichia affinis*.—W. A. Setchell.

FUNGI

199. WÖLTJE, WILHELM. Unterscheidung einiger *Penicillium*-species nach physiologischen Merkmalen. [Separation of species of *Penicillium* by physiological characters.]—Centralbl. Bakt. 48^{II}: 97-130. 1918.—The author has restudied certain species of *Penicillium* under carefully controlled cultural conditions. The literature of characterization in the genus *Penicillium* is discussed and the conclusion reached that the cultural basis for species, as proposed hitherto, has not been sufficiently standardized. As a result of careful measurement of parts, the author concludes that the morphological contrasts are too small for satisfactory separation of forms really characteristically different. He finds the color of the colony too greatly subject to variation to be reliable and to make too great demands for discrimination on the part of the worker. He, therefore, concludes that an elaborate presentation of many characters upon numerous media is necessary to establish a stable nomenclature and that these characteristics should be predominantly physiological.—For this purpose, comparative tables give the results of growth upon wort agar, wort gelatine; fluid synthetic media with nitrogen as nitrates, ammonia, and asparagin, the asparagin medium with inhibitors added such as sodium chloride, acetic acid, and lactic acid; milk, cellulose media, apple-pears, oranges, and onions. Heat tolerances are also given. The basal synthetic solution was: distilled water 100 cc., dipotassium phosphate 0.5 g., magnesium sulphate 0.25 g., cane sugar 7.5 g. The comparatively high concentration of this basal solution should be noted. Fractional sterilization was emphasized.—The named species included in the study are *Penicillium glaucum*, *P. corymbiferum*, *P. viridicatum*, *P. roquesforti*, *P. italicum*, *P. olivaceum* (*P. digitatum*), *P. purpurogenum*, and *P. luteum*. In addition 10 species are designated by Roman numerals.—The data are also collected into species characterizations which exhibit the weaknesses of the method. Each form receives a series of physiological characters each based upon results of perhaps two experiments. Wöltje finds it impossible to identify his own strains with previously described species, hence he concludes that there are a great number of undescribed species which can not be separated morphologically but for which physiological contrasts may be obtained by elaborate cultural study.—Charles Thom.

TAXONOMY OF VASCULAR PLANTS

J. M. GREENMAN, Editor

200. ANONYMOUS. Variété nouvelle d'"Aster." [New variety of Aster.] *Naturaliste Canadien* 44: 152-153. 1918.—The description of *Aster linariifolius* L. var. *Victorinii* Fernald is reprinted from *Rhodora* 14: 194. 1914.—*Adele Lewis Grant*.

201. BUSH, B. F. The genus *Euthamia* in Missouri. *Amer. Midland Nat.* 5: 157-177. 1918.—The author gives a detailed key and descriptions of the four species of *Euthamia* found in Missouri, *E. hirtella* Greene, *E. leptoccephala* (T. & G.) Greene, *E. media* Greene, and *E. cynospermoides* Greene. Two new species are described namely, *E. fastigiata*, occurring in the southeastern states, and *E. bracteata* found in the west and northwest. A number of new combinations are made.—*Adele Lewis Grant*.

202. CHURCHILL, J. R. A smooth-fruited form of *Asclepias syriaca*. *Rhodora* 20: 206-207. 1918.—*Asclepias syriaca* L. forma *inermis* is described from Massachusetts.—*J. M. Greenman*.

203. CURBITT, G. E. S. *Gordonia concentricatrix*, Burkill, (Kelat samak, Samak pulut, Kelat merah—Malay). *Jour. Straits Branch Roy. Asiatic Soc.*, 78: 49-50. Pl. 3. 1918.—Further data is recorded about this important economic species which was published recently *ibid.* 76: 152-153. 1917).—*Adele Lewis Grant*.

204. DAVIDSON, ANSTRUTHER. *Gnaphalium beneolens*, n. sp. *Bull. Southern California Acad. Sci.*, 17: 17. 1918.—A new species, *Gnaphalium beneolens*, occurring in southern California, is described and illustrated.—*Adele Lewis Grant*.

205. FARWELL, O. A. The *Trillium grandiflorum* group. *Rept. Michigan Acad. Sci.* 20: 155-159. 1918.—A key to the species, varieties and forms in this group is given, and one new species, *T. Chanleri*, one new variety, and fourteen new forms are described. All of these plants occur in a small section of woodland in Farmington township, Oakland Co., Michigan.—*Adele Lewis Grant*.

206. FARWELL, O. A. Notes on the Michigan Flora. *Rept. Michigan Acad. Sci.* 20: 161-195. 1918.—This is the first of a proposed series of papers on rare or interesting plants in Michigan. Several plants heretofore unknown to the flora of that state are recorded, new localities given and ranges extended for many others. One new species, *Polygonatum melleum*, and thirteen new varieties are described, and forty-one new combinations are listed.—*Adele Lewis Grant*.

207. FARWELL, O. A. The yellow flowered *Cypripediums*. *Rept. Michigan Acad. Sci.* 20: 197-198. 1918.—The author distinguishes three distinct forms of the Yellow Ladies Slipper occurring in Michigan. *C. pubescens* Willd. var. *Makasin* (*C. Makasin*) is described as new.—*Adele Lewis Grant*.

208. FERNALD, M. L. Some North American representatives of *Braya humilis*. *Rhodora* 20: 201-203. 1918.—The author presents a brief discussion of the Cruciferous plant, *Braya humilis* and its immediate allies, and includes two new combinations namely, *Braya humilis* (C. A. Meyer) Robinson, var. *novae-angliae* (*Pilosella novae-angliae* Rydb.) and *Braya Richardsonii* (*Pilosella Richardsonii* Rydb.).—*J. M. Greenman*.

209. FITZGERALD, WILLIAM VINCENT. The botany of the Kimberleys, North-west Australia. *Jour. and Proc. Roy. Soc. W. Australia* 3: 102-224. 1918.—Mr. Fitzgerald's paper deals with a part of Australia the flora of which is incompletely known. Six hundred and seventy-six species of ferns and flowering plants are recorded, including two genera, eighty-eight species, and five varieties which are described as new to science. The following is a

list of the new plants described: *Cycas furfuracea*, *Triglochin pterocarpa*, *Xerocloa imberis* R. Br. var. *repens*, *Eriachne pauciflora*, *Cyperus holoschoenus* R. Br. var. *ricida*, *Pimbristylis pilifera*, *P. oligocephala*, *F. arthrostylis*, *Crosslandia setifolia* gen. et sp. nov. *Cyperacearum*. *Scirpus idellensis*, *Rhynchospora affinis*, *Haemodorum longifolium*, *H. flaviflorum*, *Grassia miniata*, *G. heteroneura*, *G. erythroclada*, *Haakea Morrisoniana*, *Loranthus ferruginiflorus*, *L. biangulatus*, *Ptilotus longistachyus*, *P. Johnstonianus*, *Calandrinia Tepperiana*, *Cassia trigona*, *Cassia neurophylla*, *C. cladophylla*, *Jacksonia petrophiloides*, *J. aculeata*, *Crotalaria membranacea*, *Psoralea cuneata*, *P. virens*, *Tephrosia conspicua*, *T. stipuligera*, *Alysicarpus lasiocaulis*, *Tribulus affinis*, *T. curvicaulus*, *Boronia pauciflora*, *Euphorbia distans*, *E. comans*, *E. cinerea*, *E. chrysocantha*, *Bridelia phyllanthoides*, *Petalostigma humilis*, *Phyllanthus polycladus*, *Mallotus derbyensis*, *Buchanania oblongifolia*, *Cryptandra intratropica*, *Triumfetta reflexa*, *Sida Harkettiana*, *Abutilon Andreuxianum*, *A. propinquum*, *Hibiscus zonatus* F. v. M. var. *spinulosa*, *Brockmania membranacea* gen. et sp. nov. *Malvacearum*, *Sterculia ricoides*, *S. tuberculata*, *S. viridiflora*, *S. decipiens*, *Helicteres rhynchocarpa*, *Nesaea repens*, *Terminalia Hadleyana*, *T. chlorocarpa*, *T. biangulata*, *T. Rogerii*, *Melaleuca Crosslandiana*, *M. argentea*, *M. Loqueti*, *Fenzlia phebalioides*, *Diospyros nitens*, *Mitrasacme lepidocalyx*, *M. hispida*, *Marsdenia Brockmaniana*, *Ehretia acroclata*, *Heliotropium flaviflorum*, *Solanum Cunninghamii*, *Stemodia flaccida*, *Josephinia papillosa*, *Utricularia charleyensis*, *Pityrodia obliqua*, *Gossypium linifolium*, *G. propinquum*, *Calogyne Heppleana*, *Scaevola scabrida*, *S. stenostachya*, *S. decipiens*, *Dampiera canospermoides*, *Stylidium cordifolium*, *S. rubricapum*, *S. irritum*, *S. claytonioides*, *Olearia aspera*, *Blumea pungens*, *B. prostrata*, *Pluchea tetranthera* F. v. M. var. *cinerea*, and *Pterocaulon globuliflorum*.—J. M. Greenman.

210. GATES, REGINALD RUGGLES. A new evening primrose. *Oenothera novae-scotiae*. Proc. and Trans. Nova Scotia Inst. Sci. 14: 141-145. 2 fig. 1918.—Gates describes and illustrates a new species of evening primrose, *Oenothera novae-scotiae*, grown from seeds collected on North Mountain, near Middleton, Nova Scotia. The type is deposited in the Herbarium of the University of California.—J. M. Greenman.

211. GATES, R. RUGGLES. A systematic analytical study of certain North American *Convallariaceae*, considered in regard to their origin through discontinuous variation. Ann. Bot. 32: 253-257. 1918.—This article, according to the author, is a précis of the main points of a paper to be published after the war. [See Bot. Absts. 1, Entry 478].—Adele Lewis Grant.

212. HILL, ARTHUR W. The genus *Caltha* in the southern hemisphere. Ann. Bot. 32: 421-435. Fig. 1-10. 1918.—Eleven species in the genus *Caltha* are treated in this paper. Three of which are described as new. All of these belong to the section *Psychrophila*, based primarily on the development of the auricles of the leaf laminae forming upturned or erect appendages. These appendages are figured for most of the species. Of the new species described, *C. alata* and *C. involuta* are from South America and *C. phylloptera* is from Tasmania.—Adele Lewis Grant.

213. KOIDZUMI, GENITI. Contributiones ad floram Asiae Orientalis [Contributions to a flora of eastern Asia]. Bot. Mag. Tōkyō 32: 53-63, 134-138. 1918.—This is a continuation from Vol. 31: 262 of the same publication. The following new species and new varieties are described, all of which occur in Japan: *Myoporum boninense*, *Carex siroumensis*, *C. tenuis* Fr. var. *brevicaulis*, *C. yessoensis*, *C. boninensis*, *Calliandra glabra*, *C. Nishimurae*, *Prinoschilus* *chilensis*, *Oryzocoides japonicus* Nakai & ovalis O. japonicus & serrulatus, *Artemisia glomerata* Ledeb. var. *pedunculosa*, *Phyllodoce caerulea* Rab. var. *yessoensis*, *P. alpina*, *Achillea pulchra*, *Rosa adenochaeta*, *Rubus Grayanus* Maxim. var. *chaetophorus*, *Hypericum ovalifolium*, *Salix pauciflora*, *S. kurilensis*, *Poa misera* Koidz. var. *alpina*, *Oxytropis japonica* Maxim. var. *sericea*, *Artemisia norvegica* Fries. var. *villosa*, *Arundinella anomala* Steud. var. *glauca*, *Stachyurus macrocarpus*, *S. lanceifolius*, *Psychotria serpens* L. var. *macrophylla*, *Fatsia oligocarpa*, *Microstylis boninensis*, *Hydrangea Kowagoana*, and *Juniperus lutehuensis*. *Eriophorum Scheuchzeri* Hoppe, *Gentiana glauca* Pall., and *Sparganium submuticum* Neum. are listed as being new to the flora of Japan.—Adele Lewis Grant.

214. LUNELL, J. *Enumerantur plantae Dakotae Septentrionalis vasculares.*—XIV. [Enumeration of the vascular plants of North Dakota.]. Amer. Midland Nat. 5: 233-241. 1918. —The present article consists of a continuation of the appendix to a series of papers published under the above title. Descriptions are given of two new species and four new varieties from North Dakota namely, *Amelanchier leptodendron*, *Scrophularia dakotana*, *Peritoma serrulatum* var. *clavatum*, *Laciniaria scariosa* var. *inconcinna*, *Arnica pedunculata* var. *monocephala* A. *monocephala* Rydb.), and *Senecio canus* var. *eradiatus*.—J. M. Greenman.

215. MILLSFAUGH, C. F., AND EARL E. SHERFF. *New species of Xanthium and Solidago.* Field Mus. Nat. Hist. Bot. Ser. 4: 1-7. Pl. 1-6. 1918.—*Xanthium leptocarpum*, *X. arcuatum*, *X. cylindricum*, *X. crassifolium*, *X. acutifolium*, and *Solidago emarginata* are described as new. —J. M. Greenman.

216. MIYABE, KINGO, AND YUSHUN KUDO. *Materials for a flora of Hokkaido.* VIII. Trans. Sapporo Nat. Hist. Soc. 7: 23-35. 1918.—The present article on the flora of Hokkaido contains many notes on the distribution of plants beyond the limited area referred to by the title. Several plants are listed as being new to Hokkaido and the following new species and new forms are described: *Dryopteris okushirensis*, *Carex flaccidior*, (*C. clausenoides* var. *flaccidior* Fr. Schm.), *Ranunculus trichophyllus* Chaix. forma *nemorensis*, *R. trichophyllus* Chaix. forma *kushirensis*.—Adele Lewis Grant.

217. NAKAI, TAKENOSHIN. *Notulae ad plantas Japoniae et Koreae* XVI, XVII. [Notes on the plants of Japan and Korea. XVI, XVII.]. Bot. Mag. Tōkyō 32: 28-37, 103, 110. 1918. —The sixteenth and seventeenth numbers of this series of articles on the plants of Japan and Korea contain descriptions of eighteen new species and two new varieties. Unless otherwise noted, all the descriptions are written by Nakai. The new plants ascribed to Korea are *Castanea Furuwii*, *Fagus multinervis*, *Abelia coreana*, *Aster Oharaj*, *Alsinia macrocarpa* Penzl. var. *coreana*, and *Salix hallaisanensis* Léveillé var. *longifolia*. The rest occur in Japan, and are as follows: *Pyrus aromatica* Kikuchi & Nakai, *P. hondensis* Nakai & Kikuchi, *Corylatia latipes*, *Opulaster insularis*, *Cotoneaster Wilsonii*, *Rubus takesimensis*, *Panax takesimensis*, *Psilodendron insulare*, *Acer takesimense*, *Viburnum insularis*, *Abelia insularis*, *Cheysanthium laudum*, *Pyrus crassipes* Kikuchi & Nakai, and *Osmundus rigidus*. The last two are cultivated in Japan but their origin is unknown.—Adele Lewis Grant.

218. NAKAI, TAKENOSHIN. *Praecursores ad floram sylvaticam Koreanam.* X. [A basis for a ligneous flora of Korea.]. Bot. Mag. Tōkyō 32: 113-133. 1918. The present number of this series of articles on the woody flora of Korea discusses *Oleaceae*. Keys to the genera and species occurring in Korea are given and the following new species, new varieties, and new combinations are included: *Ligustrum foliosum*, *L. salicinum* (*L. cilicium* var. *salicinum* Nakai), *Syringa dilatata*, *S. micrantha*, *S. Kamibayashii*, *S. venosa* from Korea, and *S. bursata* occurring in China.—Adele Lewis Grant.

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